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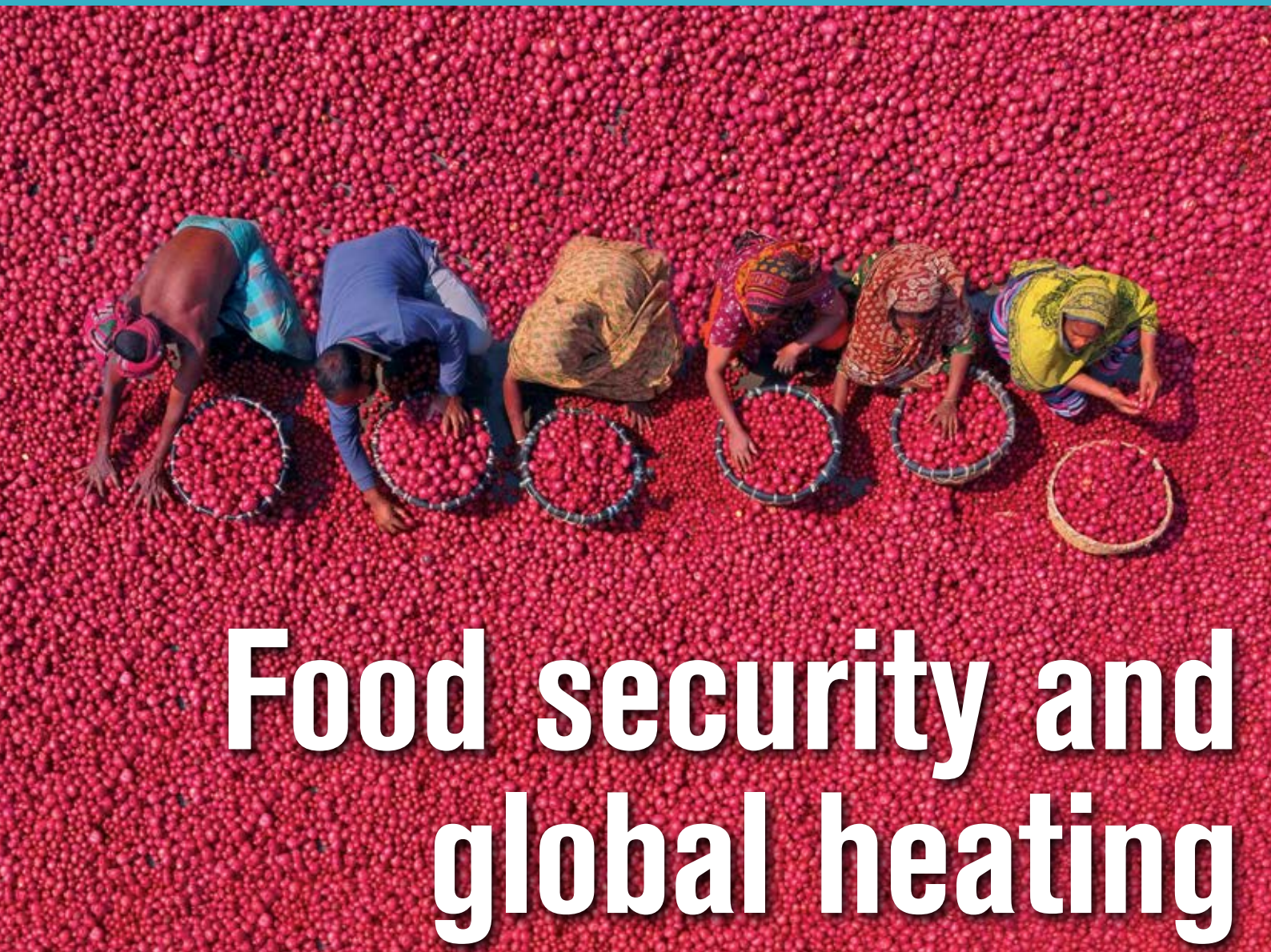
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Food security and global heating

Though humankind has been producing enough food to feed everyone on earth, hunger and malnutrition still affect poor rural communities. Climate damage will make life more difficult for them. Moreover, it is likely to reduce global food supply. It is essential to boost the resilience of vulnerable people, especially in the remote areas of disadvantaged countries. Action is needed at local, national and global levels.

Title: Bangladeshi farmers sorting potatoes.
Photo: picture-alliance/ZUMAPRESS.com/Joy Saha





Our focus section on agriculture in the time of an escalating climate crisis starts on page 17. It pertains to the UN's second Sustainable Development Goal (SDG2): Zero Hunger. It also has a bearing on the entire SDG agenda.

Integrated rural development matters more than ever

The Financial Times recently reported that cocoa prices had reached a level not seen in four decades and the international sugar price had hit a 12-year high. The reason, according to the newspaper, was markets' expectation of global supply declining due to climate impacts. The FT also pointed out that coffee prices were likely to rise further from an already high level.

Nobody starves when they do not get chocolate or coffee. However, consumers in high-income countries tend to pay attention to the prices of these goods, so increases feed inflation fears. The main tool central banks have for controlling inflation is raising interest rates. Food prices, however, hardly respond to interest-rate changes and are generally very volatile. Therefore, economists do not worry much about the cost of food items when assessing how dangerous inflation is. Accordingly, spiking food prices are an issue for agricultural policymaking, but not macroeconomic management.

"Global food security depends on environmental protection, which in turn depends on investments in sustainability in each and every sector. Failure to act is recipe for disaster, with the cost of food rising to frightful levels."

In recent decades, agriculture has consistently produced enough food for feeding everyone. Nonetheless, about 10% of the world population do not get enough to eat. Small-scale farmers are particularly affected by hunger and malnutrition. Their purchasing power, which is sometimes only slightly above zero, is so small that they rely on what they grow on their fields.

Development experts have therefore been discussing rural poverty for decades. In the 1980s, the general motto was "inte-

grated rural development". The basic idea was to do several things at once. The most important issues included – and still include:

- better support for farms in terms of advice, inputs and irrigation,
- better transport infrastructure to improve access to markets,
- better access to financial services and
- better healthcare and education to enable people to grasp opportunities.

Unfortunately, it is easier to demand integrated rural development than to actually get it started. Synergies only arise when progress in one area supports progress in others. And in view of the climate crisis, the challenges have actually become greater. Some farming inputs – in particular pesticides and fertilisers – must be used very sparingly, if at all.

In spite of many problems, scholars say integrated rural development can be done sustainably. Common sense tells us it must be done because things will fast become much more difficult if extreme weather events wipe out harvests in several of the world's most important production areas at the same time. Once that happens, food prices will spike to unprecedented levels, and central banks will not be able to do anything about it. That means that agricultural investments today have a huge macroeconomic relevance in the long term.

Economists generally assume that everything stays equal apart from the variables they want to assess in a model they design. In our time of severe environmental crisis, this assumption has become obsolete – and so have some conventional economic models. If global boiling is allowed to continue, nothing will stay the same. If we don't take action today, we will see more and worse calamities tomorrow.

Global food security depends on environmental protection, which in turn depends on investments in sustainability in each and every sector. Failure to act is recipe for disaster, with the cost of food rising to frightful levels. Coffee and chocolate prices will be of minor relevance for many consumers even in high-income countries.



HANS DEMBOWSKI
is editor-in-chief of D+C/E+Z.

euz.editor@dandc.eu



The USA has a long history of slowing down climate action: protesters in Seoul in 2005.

CLIMATE FINANCE

Unfulfilled promises

In the UN Framework Convention on Climate Change (UNFCCC) of 1992, high-income countries pledged to provide funds to help developing countries tackle climate change. Thirty years later, it is still in question whether and to what extent related promises are being fulfilled.

By Larissa Basso and Eduardo Viola

Climate-related finance is a broad term. Generally speaking, it means funding (either public or private) for reducing greenhouse-gas (GHG) emissions or adapting to the impacts of climate change.

Given that governments only have indirect discretion over private finance flows, we will focus on public finance in this essay. Public climate finance follows different avenues:

- It can be delivered through mechanisms established alongside the climate regime, such as the Global Environmental Facility (GEF), which then allocate funding to climate-related activities.
- Money can also be allocated via other multilateral institutions, especially multilateral development banks, which then fund efforts in developing countries.
- Finally, it can be delivered bilaterally, according to agreements between high-income and developing countries.

Climate finance is thus directly related to climate-change mitigation, climate adaptation or both. However, it may also target broader objectives, for example, nature-based solutions for infrastructure purposes in line with the objectives of the three so-called Rio conventions. Apart from the UNFCCC, the UN Convention on Biodiversity and the UN Convention to Combat Desertification were on the agenda of the Earth Summit in Rio de Janeiro in 1992. Global environmental objectives include:

- limiting global warming to less than 2°C compared to pre-industrial levels,
- halting further loss of biodiversity,
- protecting land and marine ecosystems and
- stopping land degradation.

Biodiversity finance aims specifically to stop or reverse nature loss in order to protect human health and prosperity. Progress on this front was recently made at the 2022 UN Biodiversity Conference in Kunming-Montréal. For example, the summit foresaw an annual \$20 billion of biodiversity funding from 2025, rising to \$30 billion from 2030 (see interview with Jochen Flasbarth on www.dandc.eu).

The climate summit in Sharm el Sheikh in 2022, moreover, decided to establish another form of climate finance. Loss

and damage funding is supposed to compensate vulnerable countries for harm already caused by climate change. However, UNFCCC members did not reach an agreement on how loss and damages will work in practice, so progress cannot be evaluated yet.

Three caveats should be made before looking at the progress high-income countries have made in providing public finance:

- A political commitment is different from a legally binding goal.
- Committed and disbursed funding are not synonyms.
- Actual results depend on disbursed money being used for tangible purposes. Assessing whether that is the case is extremely important, but beyond the scope of this article.

\$100 BILLION A YEAR

At the Copenhagen climate summit in 2009, developed countries pledged to jointly mobilise \$100 billion per year by 2020 to address climate change in developing countries. The decision was a rare example of a quantified climate-related finance target. The pledge was formalised one year later. The Paris climate summit decided that \$100 billion per year should be seen as a minimum, not a goal. The pledge included public, private, bilateral, multilateral and alternative funding.

So far, the pledge remains unfulfilled. Its reiteration along with the promise to live up to it soon have become an awkward ritual of the UN's annual climate summits. The

gap seems to be closing, but progress has been painfully slow.

In 2022, the OECD published data on climate finance for the years 2013 to 2020. In that time span, disbursements increased by almost 60%, from \$52 billion in 2013 to \$83 billion in 2020. Public finance (both bilateral and multilateral) played the largest role. Its share in total increased, from 73% (\$38 billion) in 2013 to 82% (\$68 billion) in 2020.

The World Resources Institute (WRI), an independent think tank based in Washington D.C., also analysed finance for the period from 2013 to 2018. Adjusting data to eliminate double counting, it presented smaller numbers than the OECD. According to the WRI, bilateral and multilateral climate finance from high-income to developing countries amounted to only \$22 billion in 2013 and \$33 billion in 2018. Including outflows from multilateral development banks, the figures rose to \$34 billion in 2013 and \$55 billion in 2018.

According to either data set, high-income countries did not collectively meet their pledges. Attempts to break down responsibility country by country show that very few are contributing enough. The failure fits a pattern. In 1970, high-income countries pledged to spend an annual 0.7% of their gross national income (GNI) on official development assistance (ODA). Collectively, they only disburse about 0.33% of their joint GNI.

The WRI's analysis assessed how much each developed country should contribute towards the \$100 billion/year goal considering their GNI and population, which are proxies for responsibility and capacity for climate action. The authors calculated countries' fair share based on two different scenarios. The first was that at least \$70 billion of the total should be public finance. The second was that public finance would cover \$100 billion, given that this amount is a floor, not a target. The WRI concluded that, in 2018, only Austria, Denmark, France, Germany, Japan, Norway and Sweden paid their fair share under the first scenario, and only France, Germany, Japan, Norway and Sweden did so under the second.

Britain's Overseas Development Institute (ODI) similarly concluded that in 2017/2018, only Norway, Sweden and Germany provided their fair share, with France and Japan coming close. The USA was at the

bottom, providing a mere four percent of its fair share.

WHY COUNTRIES FAIL TO COMPLY

There are several reasons why developed countries fail to fulfil their pledges. First of all, there is no sanction for non-compliance. Most climate commitments are toothless, even if they are considered legally binding. Removing the threat of sanctions makes negotiations easier, but the price is a lack of incentives for countries to comply.

The collective nature of the pledge is another factor. At first glance, a collective pledge is easier to make since individual partners do not commit to a specific sum. In the longer run, of course, it is difficult to hold individual countries accountable for

"At first glance, a collective pledge is easier to make, since individual partners do not commit to a specific sum. In the longer run, of course, it is difficult to hold individual countries accountable for collective failure if there never was a clear agreement on burden sharing."

collective failure if there never was a clear agreement on burden sharing.

In addition, there is still a lot of debate about how to implement the principle of Common But Differentiated Responsibility and Respective Capabilities (CBDR) within the UNFCCC. According to this principle, high-income countries should provide climate-related finance to developing countries. Yet countries disagree about how they should be held accountable for past emissions, and how current emissions should be addressed. These arguments generate more heat than light. As a matter of fact, no country is a monolithic entity, so governments pay attention to a variety of interests. Moreover, country groups are very heterogeneous too.

Finally, the international system is changing, and those changes have impacts on climate negotiations. Strategic competition of the USA and China is increasingly

polarising the multilateral scenario, with countries taking sides on political, economic and technological issues. The Covid-19 pandemic and the war in Ukraine have further deepened the divide.

It also matters that the US has a long history of slowing down climate action. In 2001, President George Bush Jr. withdrew from the Kyoto Protocol, arguing that it created an unfair trade advantage for China. In 2017, President Donald Trump withdrew from the Paris Agreement. Although President Joe Biden has reinstated climate change as a key issue, the current fragmentation in American politics makes it less likely that the US will assume its fair share of responsibility. Tensions between the two countries affect prospects for international cooperation in general. Like the rest of the world, both the USA and China have a rational interest in tackling climate change. Yet it remains to be seen if they will be able to collaborate in this area as competition on other issues increases.

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LARISSA BASSO

is a researcher in international environmental politics.

larissabasso@gmail.com



EDUARDO VIOLA

is a professor of international relations at the University of São Paulo, the University of Brasília and the Getúlio

Vargas Foundation.

eduardo.viola@fgv.br

SDG6

Every drop counts

Poor countries may have the worst water security. However, a high-performing economy does not necessarily make things better. That is one of the conclusions of a UN report midway through the International Decade for Action on Water for Sustainable Development.

By Mustafa Shrestha

The Water Action Decade was launched by the UN five years ago. The idea was to intensify global efforts for Sustainable Development Goal 6: Access to water and sanitation. Halfway through the decade, the UN University's Institute for Water, Environment and Health (UNU-INWEH) took stock of the global water. It assessed the state of water security for more than 7.7 billion people in 186 countries.

Its report – the “Global Water Security 2023 Assessment” – points out that access to safe drinking water and sanitation is crucial for all aspects of human health, well-being and socioeconomic development. However, the majority of the world population lacks adequate access. More than 70 % (5.5 billion) have no safe drinking water supply. Proper sanitation would help, yet over 22 % of the world's population (1.7 billion) have no access to even basic sanitation services. More than half have to get by without safely managed sanitation.

The report's authors point out that death and disease due to contaminated water are preventable and should not be a problem anywhere in the 21st century. Nonetheless, contaminated water claims more than a million lives a year, with children under five accounting for a disproportionate number of the fatalities. The UN researchers decry the situation as unacceptable.

The study finds that guaranteeing global water supply is made difficult by population growth, global economic competition and violent conflicts. But other issues matter too. Problems are compounded by the wide-ranging impacts of climate change.

The regions with the lowest levels of water security are in Africa and South Asia. The largest swath of humanity living in countries considered water insecure – 4.3 billion – is in the Asian Pacific region. Another 1.3 billion live in the

Horn of Africa, the Sahel and parts of West Africa.

Low-income countries are the least water secure. Of the 23 countries with critical water situations, 16 are on the UN list of least developed countries (LDCs). Seven are small island developing states (SIDS).

However, the INWEH researchers point out that a high-performing economy does not automatically mean greater water security. The Bahamas, for instance, is a high-income country but has a comparatively low water-security rating.

Conversely, there can be marked differences in the water-security status of countries with similarly performing economies. Libya and Malaysia are a good example: the former is critically water-insecure, the latter ranks much higher in the national water security table.

FASTER PROGRESS NEEDED TO REACH WATER GOALS

The authors bemoan that, despite the UN Action Decade, global water security is improving too slowly. By 2030, a billion people will still have no access to safe drinking water and 2.8 billion will not have access to safely managed sanitation.

The World Health Organization (WHO) and the UN Children's Fund (UNICEF) note that progress needs to be four times faster for SDG6 to be achieved by 2030. Without more effort on water, the other SDGs are also at risk.

The authors emphasise that good data is essential for development efforts, funding and legislation to be designed effectively. Moreover, they stress that many of the aspects examined are interdependent. This means that an improvement in one area would very likely lead to improvements in others.

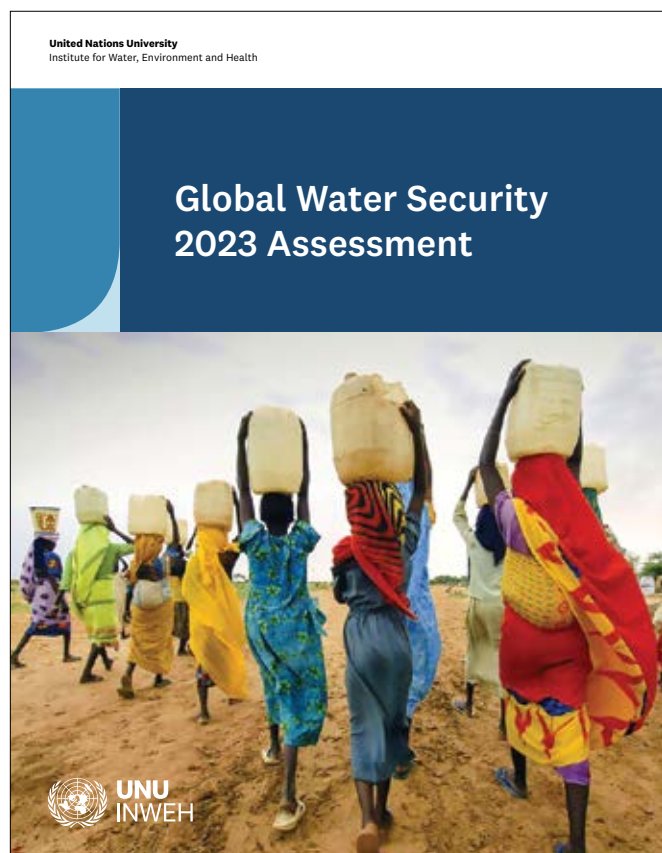
LINK

Global Water Security 2023 Assessment:
<https://inweh.unu.edu/global-water-security-2023-assessment/>



MUSTAFA SHRESTHA
is an online journalism student at Darmstadt University of Applied Sciences. He wrote this

article as part of his internship at D+C/E+Z.
eu.editor@dandc.eu



The report criticises the poor state of global water supply.



Deng Xiaoping's personal authority mattered less than competent administration based on evidence and a shared vision: poster in Shenzhen in 2019.

DEVELOPMENT STUDIES

A big gamble

To get development going, a country's elite must run considerable risks. In his new book, Stefan Dercon explains why. He also rehabilitates the much-maligned term "aid".

By Hans Dembowski

The subtitle of the book "Gambling on development" promises an explanation for "why some countries win and others lose". According to Dercon, what matters most is a national elite consensus that prioritises economic growth. Where such a "development bargain" is in place, government funds will be used to build infrastructure, improve public education as well as health care, the professor from Oxford University argues. Policies of this kind often help to reduce poverty. Moreover, macroeconomic management is likely to be prudent, and there will be scope for new export-oriented industries.

In settings of this kind, official development assistance will be normally used productively, so donor governments need not worry much about monitoring or setting conditions for loans, writes Dercon, who used to serve as chief economist at Britain's Department for International Development (DfID) as a part time job. His preferred term is "aid", but the way he uses it is not paternalistic. He does not want experts from advanced nations to tell poor partners what to do. Understood his way, "aid" assists the policies that result from a partner country's government implementing the elite consensus. Their development bargain matters, the international agencies not so much.

Dercon spells out that countries which lack an indigenous "development bargain" will not take off economically. Instead, vested interests will keep exploiting them the way they have done in the past. They will thwart serious reform attempts in fear

of losing privileges and rents. The author insists that elite groups run risks when they agree on a development deal. That gamble, however, has often proved worthwhile. A growing economy means new opportunities, many of which benefit the established elite, though less fortunate people often benefit too.

CHINA'S RISE

In the past four decades, China was the country that achieved the most spectacular development results. Dercon's explanation fits quite well. He rejects the Communist regime's narrative, according to which determined authoritarian leadership created the conditions for fast economic growth and broad-based poverty reduction. In Dercon's eyes, what really made the difference was not despotic rule. Success resulted from the top leadership

- taking an interest in testing different policy options,
- giving local leaders scope to experiment in ways those leaders deemed best, and
- then copying at the national level what worked out well at local levels.

Dercon insists that no dictator can simply order underlings to kickstart successful development. The great challenge is to find out what will do the trick. In China that meant giving local leaders the autonomy to experiment without permanent intervention from above. It also meant assessing results objectively and fairly. Doing these things required a shared vision within the Communist Party rather than a strong leader who based his power on the fear of his underlings.

In three decades, the consensus-based experimental approach to policymaking turned China from one of the poorest countries on earth to the second most powerful nation. Deng Xiaoping is praised for establishing this development regime. The full truth, according to the Oxford Professor, is that he relied on the voluntary support of

many other party cadres. The shared vision of what was to be achieved was crucial.

Not personal despotism, but competent administration based on evidence and shared principles made China prosper. Accordingly, many countries under authoritarian rule, but without a development bargain keep failing. If dictatorship as such were the key to success, Nigeria would now be an advanced nation. As Dercon spells out, it still does not have a development bargain in spite of a long history of military dictatorships. The elite consensus, according to the economist, is to share as much as possible of the nation's oil wealth among one another. Things are even worse in the Democratic Republic of the Congo, Dercon adds, because the elite consensus there allows strong players to employ violent militias in looting efforts.

On the other hand, authoritarian leadership is not needed for a development bargain to emerge. Bangladesh's trajectory followed a different pattern. When the country gained independence from Pakistan in 1971, it was internationally considered to be a hopeless case. Four decades later, it was the South Asian country that excelled in terms of achieving the Millennium Development Goals.

Bangladesh's development indicators still show it is performing better than Pakistan and India in many dimensions. Dercon argues that the development bargain which private-sector investors, government bureaucrats and civil society leaders have endorsed for a long time has proven to be quite effective. In spite of the country's reputation for corrupt and dysfunctional politics, actual policies turned out to be quite smart.

What went wrong in Afghanistan

Afghanistan is a prominent example of how donor money sometimes exacerbates a difficult situation, according to the development economist Stefan Dercon. This article briefly summarises his assessment.

During 20 years of US-led intervention, Dercon argues, Afghanistan's economy was never on a sustainable path. It depended entirely on foreign funding:

- In 2018, for example, the US alone spent at least \$45 billion to Afghanistan, most of it on military and security objectives. The sum includes the costs of US military deployment and was twice the country's gross national product.
- Direct US aid to Afghanistan, by contrast, only amounted to \$5.4 billion in 2011, of which two thirds again served military and security purposes. Other donor countries that supported the US in Afghanistan similarly spent heavily on their

respective troops as well as Afghanistan's domestic security forces. Such spending actually declined after 2011 as the security situation became more difficult.

- Afghanistan never had a fully functional state. Accordingly, international agencies had to build parallel structures to get anything done.
- The result was an economy that revolved around for-

eign funding. Enterprising Afghans started businesses that supported foreign troops and agencies. Providing security services and building facilities for international partners became an important growth sectors. When the US-led intervention ended in the summer of 2021, the entire system collapsed.

- The country's only export industry was illegal. Nonetheless, the relevance of opium revenues paled in comparison to the impact of foreign funding on the economy. The bigger

problem was the developmental failure of other sectors that did not depend on international funding.

The Oxford scholar acknowledges that some progress was made from 2001 to 2021, regarding women's rights or primary education for example. Dercon also appreciates that military intervention was not unwarranted in view of Islamist terrorism.

He is adamant, however, that donor action neither succeeded in winning hearts and minds in those areas where violent conflict continued, nor relied on authentic Afghan ownership of the programmes implemented. In Dercon's eyes, the country is ethnically divided and never developed a sense of nationhood that would equally include all ethnic communities. An important implication is that it does not have a kind of elite compromise that he calls a "development bargain". Without such a bargain, however, no country should be expected to make substantial progress (see main story). DEM



Bangladesh has created strong export sectors, improved both hard and soft infrastructures and created new opportunities for masses of people, including the poor.

WHAT DONOR GOVERNMENTS CAN DO

As a former DFID official, Dercon shows a keen interest in what donor countries can and should do. One of his messages is that setting tough conditions does not help. As he points out, Pakistan still does not have a development bargain in spite of many IMF bailouts that all went along with strict conditionalities.

Sometimes, however, foreign financing makes a positive difference beyond supporting an existing development bargain. In the early 1990s, for example, an IMF bailout helped to redefine India's elite consensus. As Dercon elaborates, central planning had previously allowed vested interests to keep exploiting their fiefdoms. Then a severe fiscal crisis was used to liberalise the economy to a large extent. Subsequent growth entrenched a new paradigm, which the elite

now shares. This development bargain is weaker than the one in Bangladesh, but it is obvious that no major political force wants to turn back to the overregulated former system.

“Not personal despotism, but competent administration based on evidence and shared principles made China prosper.”

In difficult settings, however, aid can become part of the problem. Dercon's assessment of Afghanistan offers a striking example (see box).

The big irony of international affairs, however, is that international funding often looks most urgent in places where it can achieve the least. Like Afghanistan, other very poor and strife-torn countries with dysfunctional states do not have development bargains. Nonetheless, donor governments

often see the need to provide assistance, at least of the humanitarian kind.

Dercon's advice for settings like this is to pay close attention to whether a productive elite consensus may be emerging and to do one's best to assist the forces who show an interest in establishing a development bargain. According to his insights, such bargains often emerge in times of crisis when business as usual becomes unviable. Moreover, competent technocrats in the national bureaucracy often help to broker it.

The book includes many case studies as well as a reappraisal of recent development theorising. Dercon's skillful review of the past 20 years' most important books is a useful primer for anyone unfamiliar with development studies. His elaborations draw on all of them. He is a development scholar who clearly deserves attention.



HANS DEMBOWSKI
is editor-in-chief of D+C/E+Z.

euз.editor@dandc.eu

Letters to the editor



GLOBAL ENVIRONMENTAL DUTIES

Hans Dembowski: “Accepted global duty” (D+C/E+Z Digital Monthly 2023/08, editorial, p. 3)
I fully endorse your short article. European governments have indeed accepted global

environmental duties, which include protecting biodiversity, the climate and the environment more generally. Nonetheless, not all political parties are committed to the European Green Deal equally. I would like to add that this is a prisoner's dilemma. We would get an optimum result if we had a shared global understanding of protecting the environment. The worst scenario is everyone continuing with their harmful conduct. Unfortunately, sticking to this destructive conduct typically pays off for those doing so if all others act sustainably. Those who take advantage of the situation as free riders hurt all others who want to protect the global common good. The conduct of conservative political parties is governed by concerns of be-

ing exploited by those free riders.

I wonder in what ways game theory may help us escape such situations. I teach my students that, to achieve the optimum solutions in scenarios like this, free riders must face sanctions for unsustainable and uncooperative behaviour. But how might sanctions look like in real life? Can we imagine alternatives to a world that totally depends on checks and balances? As a human and global citizen, I would like that. As an economist and game theorist, I am more doubtful.

PD Dr. Johannes Paha
Erlangen, Germany

HEALTH IS A HUMAN RIGHT

Hans Dembowski: “Environmental destruction exacer-

bates health risks” (D+C/E+Z Digital Monthly 2023/10, editorial, p. 3)

Investments in healthcare must not be justified because they are key to development, but because health is an inalienable human right. You do not directly contradict this perspective, but you do not spell it out either. Elsewhere, I see too many justifications to invest in healthcare, because it is key to economic development. This argument is definitely secondary. Would you agree?

Claudio Schuftan, Ho Chi Minh City, Vietnam

Yes, I do agree. A line or two emphasising the human-rights dimension would certainly have been quite appropriate.

Hans Dembowski

New home for tortured animals

Seventeen-year-old Sinikka Dombrowski spent almost one month volunteering in the Afasi wildlife sanctuary in the Bolivian lowlands.

I am standing in the small kitchen that belongs to the “kindergarten”, chopping up fruit and vegetables. The bowl for the Toucans is done already. They get the smallest pieces, even though they have the biggest beaks, and everything must be peeled. The kindergarten is the place where the younger animals are being raised and the newcomers are being kept in quarantine. One of the spider-monkeys, Martina, is still very young and is now being raised by one of the older peers. Martina is very lucky. The baby monkeys still need a lot of love and attention. Most of them are orphans because their mothers were shot to death.

The Afasi site about 40 kilometres north of Bolivia’s largest city, Santa Cruz, is 45 hectares in size and home to around 320 wild animals. Afasi stands for “Amigos de la Fauna Silvestre”, translated: Friends of the Wild Animals. The foundation was established 2009 by Urs Büchler from Switzerland.

Afasi is home to various species of monkeys and birds, wild boars, coatis, almost 200 tortoises and a few wildcats. All the animals taken in here were illegally kept as pets and confiscated by a state organisation. Sadly, animal smuggling is a serious problem in Bolivia.

Almost every animal at Afasi has a horrible backstory. There is a cougar that used to be the pet of an alcoholic and was traded for a bottle of liquor. Or a monkey that was held by a couple because they could not have children. An ocelot had to spend 15 years of his life in a cage barely bigger than itself.

I spend a month at Afasi, and most of the time there is only one other volunteer: Simon from Germany. We live in one of the huts on the compound. It is unusually cold for this time of year, and we are wearing our warmest clothes. The terrace we are sitting on is completely fenced, because the free-roaming capuchin monkeys can get very dangerous. The concept of Afasi: The animals are free, the humans behind bars.

Simon, who graduated from high school at the beginning of this year, wants to study zoology. “That’s why I wanted to work with animals,” he says. “Moreover, nature is very special here.” The most beautiful moments for the 19-year-old are when an animal gains trust in him and stops being scared.

Unfortunately, money is short, and Afasi is struggling to make ends meet. Everything looks a bit shabby, there are only very few employees and no own vet, who is needed urgently. But thanks to a fundraising campaign organised by a former volunteer from Switzerland, a new enclosure for the cougars is currently being built.

There, the four cats will be able to have a lot more outlet and live in a manner nearly appropriate for their species. In the future, Afasi wants to offer guided tours for tourists to earn some extra money. The large compound is not completely being used yet, but all the space will be in use sooner or later, as there are more and more animals moving in. Only a small number of them can be released into the wild again, because they are too accustomed to humans and would not survive in the wild.



SINIKKA DOMBROWSKI is a high school graduate and until recently lived with her family in Sucre, Bolivia.
sinikka.soriya.dombrowski@protonmail.com

protonmail.com

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D+C DEVELOPMENT AND COOPERATION

Sustainable development requires global awareness and local action.

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ENGAGEMENT GLOBAL gGmbH
Service für Entwicklungsinitiativen
Friedrich-Ebert-Allee 40
53113 Bonn
Phone: +49 (0) 2 28 2 07 17-0
Fax: +49 (0) 2 28 2 07 17-150
www.engagement-global.de

ADVISORY BOARD:
Selmin Çalışkan, Prof. Dr. Anna-Katharina Hornidge,
Prof. Dr. Katharina Michaelowa, Dr. Susanne Neubert, Bruno Wenn

PUBLISHER:
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This is also the legally relevant address of all indicated as responsible or entitled to represent them in this imprint.

EDITORIAL OFFICE:
Dr. Hans Dembowski (DEM; editor-in-chief; responsible for content according to Germany’s regulations), Jörg Döbereiner (JD),
Dr. Katharina Wilhelm Otieno (KO), Dagmar Wolf (DW; assistant),
Maren van Treel (MVT; social media)
Freelance support: Sabine Balk (SB), Ronald Ssegujja Ssekandi
(Nowadays column), Jan Walter Hofmann (layout), Malcolm Bell
(translation), Claire Davis (translation)
Phone: +49 (0) 69 75 91-31 10
euz.editor@dandc.eu

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Fax: +49 (0) 89 8 58 53-6 28 32
fazit-com@cover-services.de

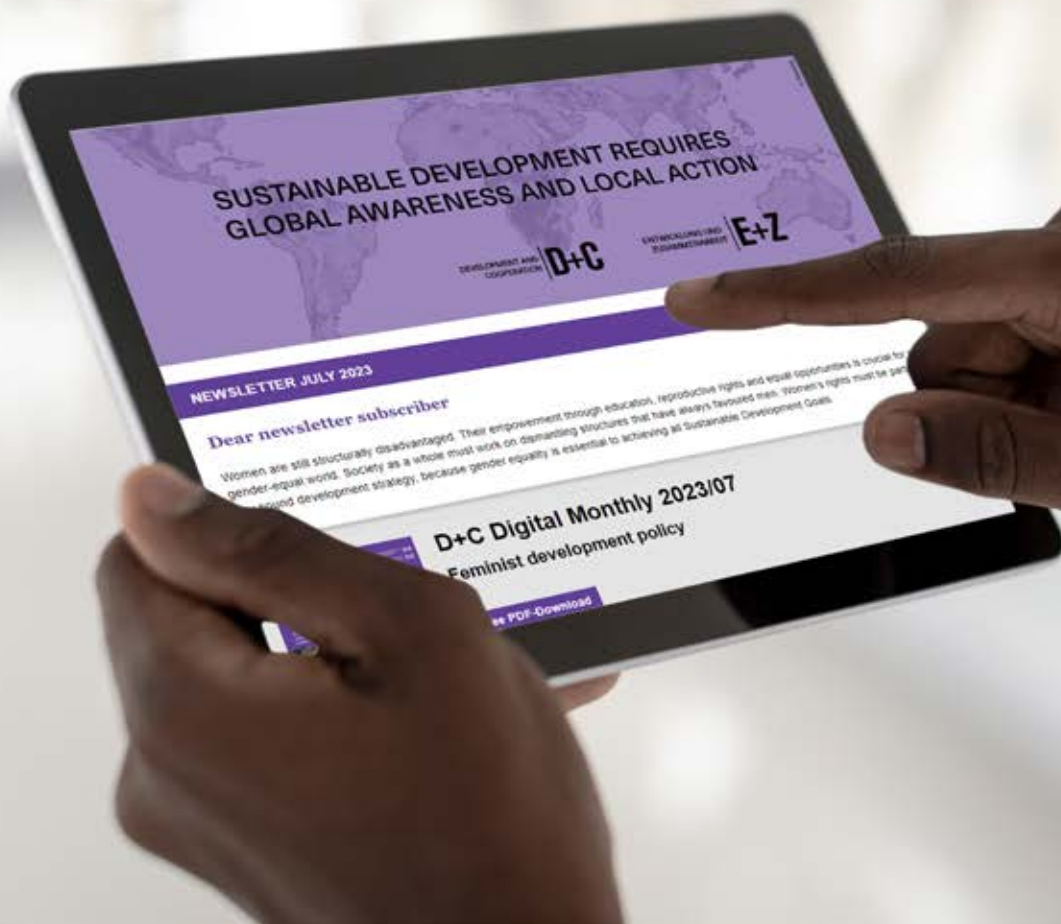
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First rockets were launched from Gaza, then they flew in the other direction too.

ISRAEL/PALESTINE

Another terrible war

By 25 October, war between Israel and Hamas claimed 5800 Palestinian and 1300 Israeli lives, according to media reports. The crisis started with Hamas terror attacks on 7 October. International authors had to assess a confusing scenario fast. Sober-minded voices acknowledged Israel's right to self-defence, but called for restraint in military operations. Some Jewish authors accused Prime Minister Benjamin Netanyahu of failure. Western leaders declared unwavering solidarity with the victim of an "unprovoked" attack, but Muslim authors tended to disagree. Some commentators conflated Hamas with "the" Palestinians, neglecting the deep animosity between Hamas and the Palestinian Authority and downplaying that terrorism exacerbates the suffering of the people the Islamist outfit claims to represent. The full truth is that Hamas and Netanyahu absurdly built a hostile alliance, doing whatever they could to prevent the peaceful two-state solution that was agreed in the Oslo peace treaties 30 years ago.

International commentary compiled by D+C/E+Z. Links to the texts are provided in the headings of the excerpts.

EDITORIAL BOARD, THE HINDU, CHENNAI, 10 OCTOBER

The attack raises moral and pragmatic questions. Hamas's indiscriminate violence against Israeli civilians is repugnant and is not going to help the Palestinian cause in any way. On the contrary, it will put more Palestinian lives at risk as Israel, equally disregarding civilian casualties, is pounding the besieged enclave. But at the same time, Palestinian territories, under the yoke of the longest occupation in modern history, have been a fuming volcano. There is no peace process. Israel has continued to build settlements in the West Bank, raising security barriers and checkpoints, limiting Palestinian movements, and never hesitating to use force or collective punishment to keep

organised Palestinians under check. (...) If Israel and other regional and international players want lasting peace and stability in the region, their focus must turn to finding a solution to the question of Palestine.

KENNETH ROTH, THE GUARDIAN, LONDON, 11 OCTOBER

Hamas's appalling attack on Israeli civilians has been widely described as the country's "9/11 moment". It is an appropriate description of such wanton cruelty. But the analogy carries a cautionary note as well. The US government lost the world's sympathy, and the moral high ground, when its response to 9/11 degenerated into a highly abusive war in Iraq, systematic torture, and endless detention without trial in Guantánamo. The Israeli government should be careful not to replicate this path to opprobrium. Indeed, such an abusive response may be exactly what Hamas wanted to provoke. (...) It is a basic premise of international humanitarian law that war crimes by one side do not justify war crimes by the other.

YUVAL NOAH HARARI, WASHINGTON POST, 11 OCTOBER

We grew up with stories about defenseless Jews hiding from the Nazis in cupboards

and cellars, with no one coming to help them. The state of Israel was founded to ensure that this would never happen again. So how did it happen? How did the state of Israel go missing in action? On one level, Israelis are paying the price for years of hubris, during which our governments and many ordinary Israelis felt we were so much stronger than the Palestinians, that we could just ignore them. There is much to criticize about the way Israel has abandoned the attempt to make peace with the Palestinians and

to key positions based on loyalty more than qualifications, took credit for every success while never taking responsibility for failures, and seemed to give little importance to either telling or hearing the truth.

EXPLAINER, JEWISH CURRENTS, NEW YORK, 10 OCTOBER

Since Israel's disengagement from Gaza in 2006, Hamas has operated as the governing authority in Gaza, often facing discontent

el's interest to strategically support Hamas in order to maintain division among Palestinians. In fact, the former New York Times Jerusalem bureau chief David K. Shipler has reported that in the early 1980s Israel offered financial support to the Muslim Brotherhood members who eventually formed Hamas, in the hopes that they would check the power of the PLO, which they viewed as a threat. This dynamic has continued into the present: In March 2019, Netanyahu told a meeting of his Likud party's Knesset members that "anyone who wants to thwart the establishment of a Palestinian state has to support bolstering Hamas and transferring money to Hamas. This is part of our strategy – to isolate the Palestinians in Gaza from the Palestinians in the West Bank."

EDITORIAL BOARD, THE GUARDIAN, LONDON, 8 OCTOBER

Just over a week ago, President Biden's national security adviser, Jake Sullivan, said: "The Middle East region is quieter today than it has been in two decades." This weekend's events have not only proven that judgment spectacularly wrong but have underscored the cost of US disengagement. There is the risk of intensified violence in the West Bank and of a wider conflagration drawing in Hezbollah in Lebanon. On Sunday morning, an Egyptian police officer shot dead two Israeli tourists in Alexandria. Hamas has not only destroyed the path towards the normalisation of relations between Saudi Arabia and Israel. It has also demonstrated, at immense human cost, that deals with Gulf states which sideline Palestinians and their needs are not a solution, and that the status quo before Saturday was neither sustainable nor containable.

GIDI WEITZ, HAARETZ, TEL AVIV, 9 OCTOBER

Effectively, Netanyahu's entire worldview collapsed over the course of a single day. He was convinced that he could make deals with corrupt Arab tyrants while ignoring the cornerstone of the Arab-Jewish conflict, the Palestinians. His life's work was to turn the ship of state from the course steered by his predecessors, from Yitzhak Rabin to Ehud Olmert, and make the two-state solution impossible. (...) The worst terror attack in Israel's history also strips Netanyahu of his title as "the terrorism expert".



A woman seeking cover from Hamas rockets in Israel.

has held for decades millions of Palestinians under occupation. But this does not justify the atrocities committed by Hamas, which in any case has never countenanced any possibility for a peace treaty with Israel and has done everything in its power to sabotage the Oslo peace process. (...) History isn't a morality tale. The real explanation for Israel's dysfunction is populism rather than any alleged immorality. For many years, Israel has been governed by a populist strongman, Benjamin Netanyahu, who is a public-relations genius but an incompetent prime minister. He has repeatedly preferred his personal interests over the national interest and has built his career on dividing the nation against itself. He has appointed people

from Gazans for its authoritarian rule and for failing to ameliorate widespread poverty under Israel's blockade. Through that time, Hamas has sometimes used rocket fire to exact concessions from Israel relating to the administration of Gaza's borders, work-permits for Gazan residents, and the adjustment of some terms of the blockade. Israel has frequently reacted to Hamas rocket attacks with bombing campaigns, an approach Israeli strategists have referred to as "mowing the grass." (...) Despite engaging in repeated skirmishes with Hamas – and often describing Hamas as a violent threat that justifies Israel's security apparatus and aggressive military responses – Israeli leaders have sometimes argued that it is in Isra-

MOUSTAFA BAYOUMI, THE GUARDIAN, LONDON, 11 OCTOBER

What exactly counts as a provocation? Not, apparently, the large number of settlers, more than 800 by one media account, who stormed al-Aqsa mosque on 5 October. Not the 248 Palestinians killed by Israeli forces or settlers between 1 January and 4 October of this year. Not the denial of Palestinian human rights and national aspirations for decades. One can, in fact must, see such actions as provocations without endorsing further murderous violence against civilians. But if you watched only US news, you would be likely to presume that Palestinians always act while Israel only reacts. You might even think that Palestinians are the ones colonizing the land of Israel, no less. And you probably believe that Israel, which holds ultimate control over the lives of 5 million Palestinians in the West Bank and Gaza and yet denies them the right to vote in Israeli elections, is a democracy. (...) We will certainly hear a great deal in the US about the Israeli Americans killed or abducted by Hamas, as we should, but will those same voices rise to the same volume for Palestinian Americans threatened and killed in Gaza? Did they also demand answers when the Israeli military shot and killed the Palestinian American journalist Shireen Abu Akleh in May 2022?

ZAIN UL ABDIN JESSAR, DHAKA TRIBUNE, 12 OCTOBER

Are the lives of Israelis more important than those of Palestinians? Why do Israelis expect peace from the oppressed when their defence minister calls Palestinians “human animals”? The shameless hypocrisy of the West, on the other hand, is simply stomach-turning, to say the least. (...) The West needs to shun its biased role in the Middle East and other regions. Instead of declaring the lengthy Israeli occupation of Palestine illegal and stopping atrocities on Palestinians, the West is fully backing the Jewish state militarily. This will lead to further escalation in the region. The only way to come out of the currently raging inferno is to give the two-state solution a chance by restoring the pre-1967 geographical boundaries. Global and regional powers as well as organisations must strive to achieve this goal. Else, there will be more deaths and bloodshed on both sides of the divide.

MARTIN KONEČNÝ, THE GUARDIAN, LONDON, 12 OCTOBER

On Monday, the EU commissioner Olivér Várhelyi unexpectedly declared – in a social media post – a freeze on EU development assistance to the Palestinians worth €690m. The scale of terror against Israel was “a turning point”, Várhelyi wrote. Providing around €300m annually, the EU is the occupied territories’ largest international source of aid. The Hungarian commissioner’s solo, and seemingly unauthorised, move was later reversed after a backlash from several governments, along with objections from the

weakening the PA and increasing the prospect of its collapse in the West Bank, suspending the funds would be a gift to Hamas. (...) Reviewing the funding to verify that it does not support Hamas or any violent activity is entirely legitimate. But pre-emptive aid suspensions only validate fake conspiracy narratives about the EU funding terrorists.

EDWARD LUCE, FINANCIAL TIMES, LONDON, 11 OCTOBER

Last weekend’s massacres were designed to provoke retaliatory Israeli atrocities in the Gaza Strip, which would validate Hamas’s



A woman wounded in an airstrike at a hospital in Gaza.

EU’s chief diplomat, Josep Borrell, and the European Council president Charles Michel. The EU will now review its aid, not formally suspend it. Várhelyi – who was nominated by the Hungarian premier Viktor Orbán, a close ally of Benjamin Netanyahu – is in charge of EU relations with neighbouring countries and rarely misses an opportunity to position himself as Israel’s staunchest ally in Brussels. (...) That suspending aid was even considered, and remains a possibility, is mind-boggling. If the goal is to punish Hamas, stopping European aid makes no sense. The EU and its member states do not fund Hamas. Freezing assistance would instead punish the EU-backed Palestinian Authority (PA), which is Hamas’s chief rival. By further

Manichean worldview and its claim to be the chief legitimate voice of the Palestinian people. It would further undercut Fatah’s control of the occupied West Bank and fan extremism in Israel. Each of these knock-on effects would harm America’s standing and further undermine Israel’s security. The emotional temptation is to offer Netanyahu’s government unconditional support. It is hard to hear stories of slaughtered infants and not succumb to blind vengefulness. The rational position is to reject the playbook that Hamas wants. (...) Israelis and Palestinians are on the brink of writing an even darker chapter in their history. Biden has the means to hijack that script. It is the most pro-Israeli thing he could do.



Supporters of Imran Khan in Karachi in August 2023.

POLYCRISIS

Hard times

Pakistan is stuck in a deep crisis. The country must rise to huge political, security, economic and environmental challenges.

By Imran Mukhtar

In August 2023, expensive electricity bills sparked a public uproar across the country. People set their bills on fire to mark their protest. The business community, moreover, staged a shutdown to highlight increasing production costs.

The background is that the cost of living has sharply increased in the past 18 months. Prices of basic commodities now exceed the purchasing power of the middle classes. There were unexpected hikes in fuel, electricity and gas tariffs.

According to the Asian Development Bank, Pakistan's inflation accelerated to 29.2% in the fiscal year 2022/23 – up from 12.2% in 2021/22. At the same time, large parts of the country never recovered from last year's devastating floods, which exacerbated the pre-existing economic mess.

Amidst this misery, the country faces political unrest and uncertainty. A general election is legally due by 6 November at the latest, but the Election Commission has indicated it will only be held in late January.

Many doubt that it will happen as planned. The biggest question, however, is whether credible elections are possible at all in view of the current turmoil.

In April 2022, Prime Minister Imran Khan was ousted through a parliamentary vote of no-confidence. Khan keeps blaming the powerful military establishment for his removal, but the generals deny those allegations. Khan is a former cricket star and quite popular – not least because he does not belong to either of the large and largely discredited political camps which gravitate around the PML-N (Pakistan Muslim League – Nawaz) on the one hand and PPP (Pakistan Peoples Party) on the other. These traditional forces forged an awkward coalition to oust him.

Following his removal from office, Khan launched a protest movement. He tried to force the government to announce snap polls which he believed he would win. He twice told supporters to march on Islamabad, the capital city. In November last year, he survived a gun attack during a rally.

However, Khan is embroiled in several legal cases. He has been found guilty of corruption but has filed an appeal against that judgment. He is also accused of instigating unrest and terrorism. Violent protests

erupted after his arrest in May. In response, the security forces have clamped down on Khan's party PTI (Pakistan Tehreek-e-Insaf) and its supporters.

The 71-year-old ex-premier is currently languishing in a high-security jail. His followers suspect that he has been put behind bars to keep him from running in the general elections. A recent statement by Anwaar ul Haq Kakar, the caretaker prime minister, has further fanned their anger. He said that "fair" elections were possible without Khan and his jailed party leaders. Remarks like this increase people's doubts regarding the credibility of the upcoming election.

Other politicians face legal problems too. Nawaz Sharif, a three-time former prime minister, who has been living abroad for years, has returned home to lead the election campaign of the PML-N. He will have to fight a legal battle to make such a political comeback. After all, he has been convicted of corruption and is therefore disqualified from holding any public office.

The security situation in the country is fragile. Terrorism incidents have increased since the Taliban took over Afghanistan in August 2021.

All of this is exacerbating economic problems. Apart from inflation, Pakistan is grappling with dwindling foreign reserves, the declining value of its currency and a high fiscal deficit. The debt situation is difficult too. Earlier this year, the country got a \$3 billion loan from the International Monetary Fund (IMF). A comprehensive resolution of all sovereign debt problems, however, would require a deal involving all creditors, including China. Serious negotiations on this important matter have not even begun.

In the past, most elections in Pakistan remained controversial due to rigging allegations. The country now needs free, fair and prompt elections to regain political stability. After all, only a fully legitimate government can sort out the economic mess. Polls can only be credible if all parties are given a fair chance to compete. Whether the nation will get what it needs is an entirely different question.



IMRAN MUKHTAR
is an Islamabad-based
journalist.

imranmukhtar@live.com



Occasional clean-up campaigns are not enough: volunteers fighting pollution at a Nairobi dumpsite in June 2023.

POLLUTION

Restore Nairobi River

The river running through Kenya's capital is a health hazard and an environmental mess, despite numerous efforts to clean it up. In order to improve the situation in the long term, residents' living conditions must be addressed.

By Joseph Maina

Many cities in the world have beautiful rivers flowing through them that provide excellent sites for recreation and water for both humans and animals. Nairobi is different, however. Its river is considered the most polluted one in Kenya. The water is no longer potable or suited for many other day-to-day purposes.

Nairobi River's water looks blackish, smells bad and carries loads of dark floating material. Oil drifts on its surface, damaging plant and animal life. Plastic bottles and debris line the banks. There are no fish, so there is not fishing either. Instead of a healthy natural resource providing much-needed respite from the vexations of city life, this river is a hideous flow of filth, stench and disease.

Nairobi River is actually an open sewer, carrying sewage from pit-latrines of the adjoining slums. Factories discharge petrochemicals and metals directly into the river, and car washes dispose of their dirt water.

Added to the mix is oil and grease from roads and informal garages.

On various occasions, the government has criticised the pollution, but hardly anything changes. Despite the multitude of environmental and health risks, authorities have been unable to restore the river. A number of initiatives have been rolled out, but none of them has succeeded in curtailing the intentional dumping of wastes into the river – and certainly not in the long run.

The city's population is growing fast. Housing and sanitation systems are inadequate. These are prime reasons for the river's sorry state. As of 2020, only 40% of Nairobi was connected to a sewerage system, according to World Bank data. The river ultimately ends up losing in this scenario. For poor communities who live on its banks, the river is the only waste-disposal system available. There is no municipal service they might rely on.

IMPROVING PEOPLE'S LIVES

Restoring polluted water bodies in major cities like Nairobi requires more than clean-up efforts. Kenya's capital has seen many of them. As experts such as Inger Andersen, the executive director of the UN Environment Programme (UNEP) regularly point out, the point is to improve people's lives.

If further pollution is to be prevented, communities must be empowered to live dignified lives. This includes access to safe drinking water and sanitation, as required by the UN's 6th Sustainable Development Goal (SDG). Consequently, more must happen to empower lower-income households along the river. Investing in urban infrastructure and enforcing laws is essential.

Authorities at national and subnational levels need to walk the talk. Formal and informal businesses that dump effluent must be held accountable. Where profits are made, supposed "poverty" is no excuse for malpractices. Various industries, garages, slaughterhouses and car washes pollute the river. It is alarming that they hardly ever face consequences.

There are many good reasons for restoring Nairobi River. Aside from stopping the imminent and farreaching environmental and health hazards, Nairobians – and Kenyans at large – stand to benefit from a cleaner Nairobi River. It could attract enterprises, thus boosting the city's economy. Treatment plants could make the water safe for domestic and agricultural use. Opportunities for fun and recreation would arise. Water life might thrive again. Ultimately, a clean river could enhance Nairobi's overall image and elevate it to the league of global cities that are renowned for the care they bestow on their water bodies.



JOSEPH MAINA
is a freelance writer based in Naivasha, Kenya.

mainajoseph166@gmail.com

Millet field destroyed by flooding in Cameroon.

FOCUS

Food security and global heating

Greenhouses for Kenya's Turkana county

By Rael Nkoi Lomoti (p. 18)

Global food security in the climate crisis

By Joachim von Braun (p. 20)

Violent land-use conflicts in Nigeria

By Adaze Okeaya-inneh (p. 22)

Legally secure access to land is crucial

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How GFAR is becoming GFAiR

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Helping farmers in Bangladesh to adapt

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Using groundwater resources in Africa

By Johannes Münch, Ramon Brentführer and Michael Eichholz (p. 28)

There is enough food for everyone

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Why gene banks are of great value

By Stefan Schmitz (p. 32)

PASTORALIST COMMUNITIES

Greenhouses in the desert

In Kenya's arid Turkana County, the climate crisis is wreaking havoc. Severe drought, disappearing water sources and dwindling livestock are driving the Turkana people to the brink of famine. Local organisations are trying to achieve food security through innovative farming approaches and culturally sensitive workshops. It means giving up unsustainable rural traditions.

By Rael Nkoi Lomoti

The devastating impacts of the climate crisis have disrupted the livelihoods of millions of people. Extreme weather events such as droughts and floods have hit nations across the world, but low-income countries are affected most.

A large number of people have no access to food and clean drinking water. Malnutrition hits the weakest groups in society hardest. Children drop out of school, while the problems of the elderly and people with disabilities worsen.

The impacts on food security are particularly felt in regions with generally harsh conditions, especially in arid and semi-arid lands (ASAL).

Turkana County in northern Kenya is one such region. With not quite 72 million square kilometres, it is the country's largest county and home to about 930,000 people (excluding refugees who have fled the ongoing conflicts in neighbouring South Sudan and mostly live in Kakuma, one of the world's largest refugee camps).

Turkana has always had little and rather erratic rainfall throughout the year. Large parts of the region are desert. Temperatures go up to 40 degrees in the dry season. Evaporation rates are high. The annual rainfall rate is about 300 millimetres.

Things are getting worse. Droughts have been recorded since the 1960s. They used to occur approximately every five years, but since the 1990s, they have become an annual phenomenon. In the recent years, the situation deteriorated further. Some parts of Turkana did not get any significant rainfall in the last four years.

The county is home to the Turkana community. The Turkana are nomadic pastoralists who keep cattle, donkeys, camels and goats as a source of income and for subsistence.

Due to their dependence on livestock, they are particularly affected by the extreme weather. Whatever hurts their herds, has an immediate impact on their livelihood. When the animals starve, their owners are at risk of starvation too.

According to the Turkana County administration, approximately 800,000 people are currently suffering malnutrition to some extent. Many are in acute risk of starvation.

MAJOR SHIFT IN APPROACH NEEDED

It is necessary to adapt strategically to the climate crisis to protect people from its devastating impacts. In Turkana County, it is mainly civil society that is trying to improve the situation in a sustainable way. The Kenyan government mostly focuses on short-term relief, distributing basic food and medical aid to the most vulnerable groups.

However, a fundamental shift in approach is needed. The climate crisis will not disappear. The Turkana community must be guided in the shift from livestock rearing towards other, more sustainable livelihoods. Unless people adopt new practices, they cannot become self-reliant and food secure. They will stay dependent on food aid.

Desert Roses is a community-based organisation (CBO) working in the region. One of its concerns is to address food insecurity. Apart from educating the Turkana community on sustainable agriculture, Desert Roses is setting up greenhouses in the region.

The greenhouses are collectively owned. They typically belong to a village or community and use a local borehole. Water is stored in tanks for times of severe drought. Community members work in turns. All produce is shared by the community. The products could be sold in local markets in the future.

According to county statistics, Turkana has about 2.5 million hectares of arable land. On the upside, the potential for using solar energy is great, and it can facilitate various farming practices.

However, the situation in Turkana is desperate due to a number of problems besides the climate crisis. First, the Turkana still live very traditionally, with cattle playing a central role. Women and girls are often neglected, but boys too only tend to receive



Many people in Turkana are in acute risk of starvation.

little formal education. Girls' lives revolve around (early) marriage. The main reason is that parents expect a bride price which is paid in livestock and thus makes the family's herd more numerous. Due to the ongoing drought, herds are dwindling however, and the traditional bride-price system is completely out of balance. Trying to adhere to it only exacerbates the problems.

Because of their nomadic life, Turkana children normally do not attend school regularly, so the illiteracy rate is high, even among the adult men. Low literacy, however, makes it very difficult to teach people sustainable alternatives to their traditional livelihoods.

Poor infrastructure is another challenge. Many places lack boreholes, and existing ones are drying up. The water level of the few rivers is not constantly monitored, so there is no reliable data on the availability of water. The lack of water, however, is certainly the biggest challenge to food security in the region.

Several things would help. People need tanks and manage them well. They

need better technology to extract water. And it would make sense to power borehole extraction with solar energy.

Local organisations in Turkana face additional challenges, including financial constraints, soil acidification as well as the lack of skilled labour and technical expertise. Turkana is also marked by sometimes armed conflicts over livestock.

To promote sustainable agriculture in the region, grassroots organisations need support so they

- can acquire more seedlings and farming equipment, set up more greenhouses and plant more trees,
- do awareness raising on water use and farming,
- invest in smart agriculture, such as promoting the cultivation of drought-tolerant crops and smallholder agriculture, and
- embrace research by partnering with institutions focusing on smart agriculture and green energy.

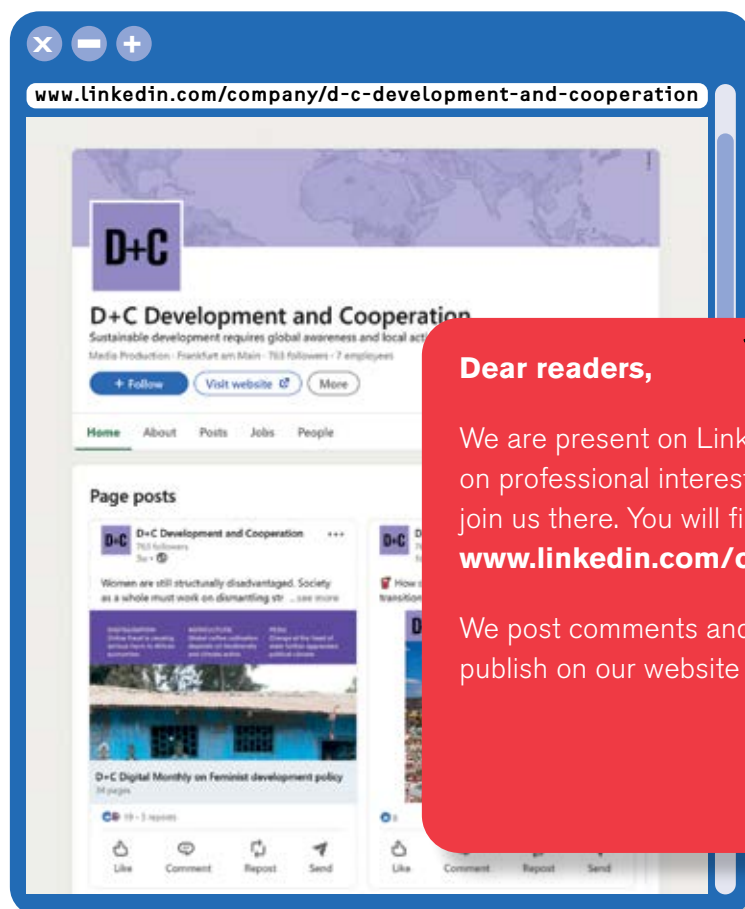
To build a food-secure society, socio-cultural and infrastructural factors need to be addressed coherently. People's accept-



ance is crucial for community workshops on greenhouses, kitchen gardens, or large-scale agriculture to succeed. Centuries-old practices are becoming unviable and related values are now causing harm. Turkana culture must adapt – but if people feel disrespected, they will refuse change.



RAEL NKOI LOMOTI
is the founder of Desert
Roses and a Turkana.
[desertrosesfootballacademy@
gmail.com](mailto:desertrosesfootballacademy@gmail.com)



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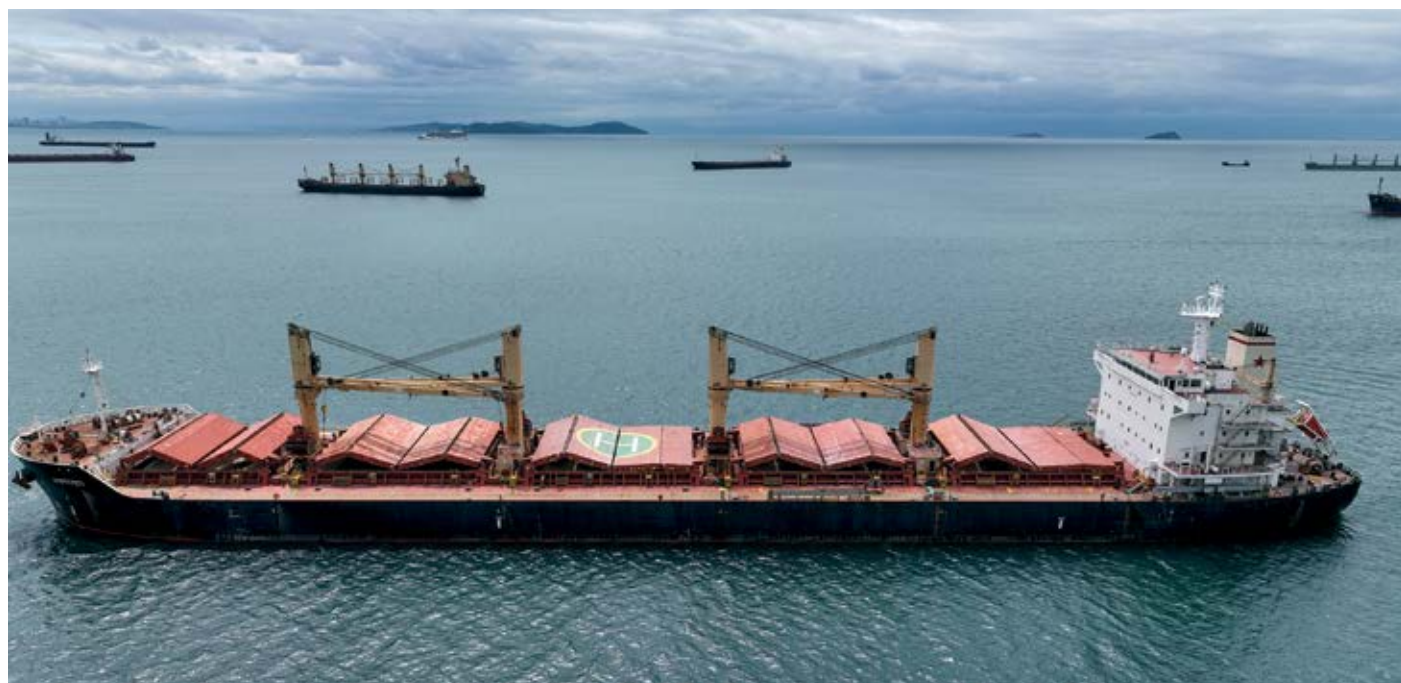
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Restricted trade means higher prices: grain ship from Ukraine near Istanbul.

GLOBAL GOVERNANCE

How to safeguard food security in climate crisis

Climate change is causing heat waves, droughts, wildfires and floods, all of which affect the food system. At the same time, food production contributes to climate change, causing about 30% of global greenhouse-gas emissions. This multifaceted problem needs a multifaceted solution.

By Joachim von Braun

The global community, and countries in their contexts, must modify food systems in ways that overcome current food insecurity and ensure food security long term. All issues must be addressed head on.

“Food security” is defined as access to sufficient quantities of food in appropriate quality. It obviously depends on an adequate and affordable supply of all ingredients required for a nutritious diet. Today, about 735 million people around the world do not get sufficient food and are undernourished

as a result. About 3 billion, moreover, do not consume healthy diets.

Unless comprehensive action is taken, the climate crisis will make matters worse. A holistic agri-food system perspective must consider the entire range of actors involved in the production, aggregation, processing, distribution, consumption and disposal of food products. It must also take account of agriculture (including livestock), forestry, fisheries and food industries, as well as the broader economy, social disparities and the natural environment.

A sustainable food system must achieve good nutrition for all in a way that preserves the foundations of future generations’ food security. This challenge has economic, social, cultural and environmental dimensions. It is crucial to preventing further loss of biodiversity and to stabilising the climate.

Many national food systems, as well as the global food system, are losing resil-

ience. “Resilience” is the capability to cope with shocks without significant loss of livelihood, health and nutrition. Food-system resilience can be understood as a function of hazard, vulnerability and exposure to climate risks. It is therefore essential to limit the climate-related hazards that affect food supply, reduce food systems’ vulnerability and lower people’s exposure to risks. Three policy approaches serve this triple purpose:

1. Mitigation of climate change. Radically reducing emissions of CO₂ and other greenhouse gases is indispensable for sustainable food security. Global heating is leading to extreme weather events, which affect production as well as farm workers’ health. Moreover, recent science suggests that extreme heat curtails photosynthesis, with serious impacts on crops and forests. And this is not just a terrestrial agenda, because climate change affects oceans, which also have a bearing on food systems. Nature-based solutions such as agroforestry, coupled with sustainable land and soil management, serve mitigation. However, mitigation in itself is no longer enough to safeguard food security.

2. Adaptation to climate change. People can protect themselves by increasing their chances to cope. Important issues include affordable access to clean energy, water and healthcare. All of them have

a bearing on good nutrition. Long-term adaptation, however, will be impossible unless mitigation puts an end to further heating.

3. Transformation. Socio-ecological systems, including the lifestyles of wealthy nations, must change to become sustainable. In particular, people in high-income countries must reduce their consumption and assume responsibility for their impact on the environment.

The climate crisis negatively affects food security in several ways. For example, access to safe drinking water is becoming more precarious. Climate events like floods often disrupt it. Diarrhoeal diseases, however, affect humans' intake of micronutrients. These illnesses have a strong correlation with rising temperatures. At the same time, heat waves make it more difficult to handle food safely.

The climate crisis also affects market dynamics and causes price volatility. Price hikes are happening more frequently. Several issues can exacerbate the impacts of weather-related shortfalls in food production. They include poor market transparency, financial speculation in commodity markets as well as export restrictions. The current grain-market disruptions resulting from Russia's attack on Ukraine show how important unrestricted exports are.

CRUCIAL POLICY AREAS

Policymakers' action must not only boost food systems' resilience against known risks around the world, but also increase resilience to so-far unknown ones. Cross-cutting action is necessary. In particular, progress is needed in seven policy areas:

1. Sustainable land management (SLM): Relevant aspects include sustainable water management, ecosystem health, agricultural productivity, climate adaptation and mitigation as well as the protection of biodiversity. SLM incentives (such as payments for ecosystem services) are necessary. Crop cultivation and livestock production must be practiced in economically viable and environmentally sustainable ways.

2. Social protection. Poverty often undermines families' food security. Nutrition interventions like school meal programmes are helpful. So are cash-transfer schemes or job creation. Countries with low and middle incomes deserve support for improving social protection. Access to healthcare and

education are essential. Where related policies are not in place, they should be adopted. Food security hinges on the reduction of inequality.

3. Diversification. Diversifying agriculture and supply chains strengthens food-system resilience. However, diversification has costs as it reduces opportunities for economies of scale and specialisation. Transaction costs tend to rise accordingly. Another challenge is that resilience is not just about withstanding current shocks, but also about maintaining the capacity for future development. If diversification hampers the latter, it is not fully conducive to resilience building.

"The global community must shift to a sustainable bioeconomy. It also needs a coherent governance structure to safeguard both food security and the global environment."

4. International trade. Ensuring free and open global food trade will require a reinvigoration of the World Trade Organization (WTO). Panic-induced border closures lead to international price spikes. Transparent information on production, stocks and government interventions around the world is critical and must be made publicly available (e.g., through the Agricultural Market Information System – AMIS). Trade facilitation in terms of investments in infrastructure – including particularly the digitisation of customs systems – matters too.

5. Insurance is a promising tool to strengthen food-system resilience. It spreads both the risks and the costs of negative shocks among a large pool of people, enhancing resilience at the level of individuals. However, it does not prevent or reduce climate risks. Insurance may thus prove counterproductive if it motivates people to continue unsustainable activities. Though this kind of financial service is quite effective in terms of managing individual shocks, it is less useful when many people experience shock impacts at once, as is typically the case in extreme weather events.

6. Migration. In response to the climate crisis, people are leaving their homes.

In some cases, migration is basically a form of livelihood diversification. Remittances from migrant workers contribute to their families' resilience after all. However, entire areas are likely to become uninhabitable, for example, as the rising sea level inundates islands. Migration processes and policies need to be coordinated, and both sending and receiving countries must act in ways that make migration strengthen the resilience of individuals and systems. Climate refugees from countries that are becoming uninhabitable must get an internationally recognised climate refugee passport.

7. Science-based innovation. Science is facilitating key innovations in food systems, including efforts to reduce risks and to enhance productivity. Bioscience and digital technology are important. Scientific research also helps to find new ways to maintain and, if necessary, renew productive soils, water resources and even entire landscapes. Science is also needed to protect biodiversity, including agricultural genetic diversity. Research can help to reduce inequality too. More funding is needed for research on food systems.

We live in the Anthropocene, the age in which humanity is shaping the Earth's geosphere, biosphere and atmosphere. Action to enhance food security must be embedded in a broad strategic agenda of transformation. The global community must shift to a sustainable bioeconomy. It also needs a coherent governance structure to safeguard both food security and the global environment. The SDGs provide the concept, but not the policy framework for such joint action.

Long-term food security is intricately linked to the UN Framework Convention on Climate Change, the UN Convention on Biodiversity, the UN Convention to Combat Desertification and the Sustainable Development Goals. So far, appropriate funding has not been made available for any of the above-mentioned global agreements. That must change for the sake of humanity's common future.



JOACHIM VON BRAUN
is a professor for economic and technical change at Bonn University's Center for Development Research (ZEF

– Zentrum für Entwicklungsforschung).
jvonbraun@uni-bonn.de



Farmers and nomadic herders need the same land: herd grazing between fields in Niger State in 2018.

JUSTICE

Violent land-use conflicts hurt food security in Nigeria

In view of a fast-growing population, demand for land is increasing in Nigeria. At the same time, the climate crisis is compounding problems in agriculture. Land-use conflicts further diminish the scope for food production and other kinds of economic activity. Whether violent action is criminal or merely self-defence can be hard to tell.

By Adaze Okeaya-inneh

Land-use conflicts are social disputes that can quickly turn violent. They occur when individuals or groups want to use an area for different purposes, like agriculture, housing, industry, commerce, recreation or transportation. Tensions become particularly likely when people believe that their rights are being violated.

In Nigeria, land-use conflicts vary from one region to another, though there are common themes. In the north, Fulani herding communities frequently clash with farmers. The violence sometimes spreads into cities as well. In south-eastern Nigeria, oil companies and local people have a long history of clashes.

Nigeria's rapid population growth is compounding problems. According to UN data, Nigeria currently has over 200 million people, and the number is expected to double by 2050. The increase in people puts additional pressure on limited land in rural as well as urban areas.

The climate crisis is exacerbating resource-related conflicts further. Competition for water, arable land and pastures for herds is increasing at a time when traditional practices are becoming unviable.

Land ownership is crucially relevant, but often controversial. One reason is that traditional and especially collective ownership is often not properly recognised. Moreover, vacant plots may be considered to not belong to anyone. Encroachment, the unauthorised sale of community land and rental conditions can trigger conflicts in which local people are often pitted against outsiders. Whether a community-based group is simply acting in self-defence or has actually become an illegal gang is often not obvious, but a matter of perspective.

A typical kind of conflict is timber contractors versus farmers. Contractors of-

ten destroy farmlands when felling trees for commercial use.

Violent encounters between farming and herding communities are extremely worrisome. Disputes arise when herds destroy fields or even feed on farmers' crops. As the north is becoming more arid, nomadic herders look for pastures farther south, moving into areas where villages have been expanding their fields. Both sides feel that they are merely defending their livelihoods and insisting on what belongs to them.

Making matters more explosive, the herders are typically Fulani, a predominantly Muslim ethnic group, while farmers are often Christians of other ethnic groups. Tensions over land use thus become entangled with faith-based identity politics. Given that Islamist terrorism is affecting some parts of Nigeria quite seriously, this is most dangerous.

Land-use problems also haunt the Niger Delta. Since independence, there have been various periods of violence and even full-blown civil war. Oil exploitation on community lands is problematic. International corporations have caused massive oil spills on land and in rivers, destroying livelihoods. Local people can no longer farm or fish, and their health has been impacted as well. Oil companies do not pay adequate compensations.

Government policies on land use and officers' abuse of power also cause disputes. The Land Use Act of 1978 is itself a bone of contention. It has been amended several times, but it does not take traditional notions of ownership and the right to access land into account properly. Government officers have a pattern of using legal ambiguities to demand bribes and using their powers arbitrarily. It can be quite difficult to tell at what point an official procedure turns into an illegal extortion scheme.

The rate of food insecurity in Nigeria is alarming. Last year, Cadre Harmonisé, a UN supported West African tool for assessing food security, forecasts that about 25 million Nigerians would be at risk of food insecurity this summer.

Land-use conflicts not only contribute to food insecurity, but also increase insecurity in general. In parts of north-western Nigeria, farmers are often forced to pay levies to armed bandits before they can go to their fields. Some pay with their crops, but many farmers cannot pay at all. As a result, food

production is hampered. The problem is transferred to consumers when food prices increase. Poverty is therefore worsening in already marginalised areas.

When attacks escalate, some farmers flee and desert their lands. In extreme cases, entire communities are forced to relocate. Internal displacement is a huge issue in Nigeria, and the side effects include a loss of culture and identity.

Climate change is causing extreme weather in Nigeria, which also has an adverse effect on agriculture. During the 2022 rainy season, widespread flooding damaged 676,000 hectares of farmland; 27 of Nigeria's 36 states were affected. The flooding exacerbated food insecurity as well. Slow trends such as worsening aridity obviously affect agriculture too.

Land conflicts restrict the land available for agricultural production and environmental conservation efforts. They also obstruct development. In rural Nigeria, telecommunication companies have been prevented from laying their cables and denied

access to their facilities until they make illegal payments to community leaders.

THE WAY FORWARD

Resolving land use conflicts will require peacebuilding measures, as well as a change in government policies. Experts have proposed a review of the Land Use Act of 1978 to make room for meaningful growth in agriculture and other sectors. To ensure food security and reduce land-use conflicts, the government must consider adopting policies that encourage sustainable agricultural practices, increase climate resilience and boost investment in renewable energy.

Courts play an important role in solving land disputes. However, legal processes take time and are expensive. Though they hurt the relationship between aggrieved parties, they are a legitimate source of conflict resolution. Some consider Kenya's Environmental and Land Courts (ELC), which are designed to reconcile formal and tradi-

tional understandings of justice, an example.

Another important step would be to encourage nomadic herders to switch to more sedentary livestock production. Measures could include teaching herdsmen local feed-preservation techniques, storing excess herbage using silage and hay and facilitating negotiations led by neutral parties. Nigeria has the natural resources to become one of the top agriculture-producing countries, but the first step is to give agriculture the attention it deserves and make good use of available arable land.

Reducing population growth and mitigating the climate crisis would help too. While Nigeria cannot rise to the latter challenge on its own, progress in fighting poverty would help to tackle the former one.



ADAZE OKEAYA-INNEH
is a journalist and
screenwriter in Lagos.

adazeirefunmi@gmail.com

FARMERS' RIGHTS

Crucial links

Rural communities need secure land tenure to cope with the climate crisis. As land ownership boosts their resilience, related rights must be strengthened. So far, there is too little public awareness of the matter – and, as a result, too little policy action as well.

By Valeria Pesce, Nathaniel Don Marquez and Romy Sato

Rural communities tend to be especially vulnerable. They need to be empowered so they become more resilient. Better land tenure serves that purpose because it enables them to adapt to the changing climate in ways that suit their specific needs:

- Secure tenure gives rural communities a long-term stake in the health of their land and thus creates incentives to invest

in sustainable land-management practices. Land ownership also ensures they have resources for doing so.

- Experience shows that rural communities with secure land tenure are indeed more likely to adopt practices that prevent soil erosion, promote agroforestry and conserve water resources. These measures serve resilience against climate change-induced disasters.

- Land tenure enables communities to engage in efforts to conserve biodiversity. When communities have control over their land, they are more likely to establish protected areas, implement wildlife corridors and apply traditional ecological knowledge in ways that safeguard local biodiversity. Diverse ecosystems, in turn, are more resilient to climate disruptions.

- Rural communities intimately understand the unique climate challenges they face. With secure land tenure, they will develop local adaptation strategies that suit their needs, including crop diversification, soil improvement and sustainable water management.

At the same time, secure land tenure serves climate-change mitigation too:

- Trees take many years to grow, and rural families who know they will benefit from long-term investments are more likely to engage in afforestation and reforestation. Trees are carbon sinks, absorbing atmospheric carbon dioxide and mitigating greenhouse-gas emissions. To some extent, international funding is available for afforestation and reforestation. However, secure tenure rights are often a precondition for participating in projects related to REDD (Reduced Emissions from Deforestation and Forest Degradation).

- Tenure security allows communities to invest in agroecology and organic farming. These environment-friendly methods reduce the need for chemical inputs, ulti-

mately lowering carbon emissions from the agricultural sector.

- People with land-tenure rights can participate in generation of solar and wind power. By diversifying sources of revenue and contributing to clean energy generation, these initiatives help to reduce the use of fossil fuels.

ADVOCACY MATTERS

The empowerment of local rural communities through secure land-tenure rights requires concerted efforts on multiple fronts. Too many rural people have no rights – or only rather shaky rights – to the land they depend on. Women in particular are often denied what they should be entitled to.

Advocacy plays a pivotal role in ensuring that policymakers recognise the intrinsic links between land tenure on the one hand and climate adaptation and mitigation on the other. Advocacy groups will obviously benefit from solid data and scientific evidence. It is important to highlight success stories. Such examples can inspire others and encourage policymakers to promote change. On the other hand, case studies and evidence documenting disasters can help to avoid repeating mistakes.

A positive example is the promotion of mangrove co-management approaches in Bangladesh. A key component was the allocation of clear tenure rights to local communities. Land tenure allows them to use and manage mangroves in ways that increase their resilience to flooding resulting from sea-level rise.

It is important to push for reforms and policy initiatives to enhance local people's land tenure. It also makes sense to promote collective land use planning, involving rural communities in climate action. Relevant policy measures include:

- the legal recognition of customary land rights,
- streamlined land-registration processes and
- protection against land grabbing.

Advocacy is more effective when diverse stakeholders collaborate. Civil-society organisations, community-based initiatives, research institutions and government agencies should cooperate on amplifying the message. So far, however, there is a lack of grassroots involvement. All too often, local voices are not heard. Community-based



Landless rural people protesting in Brazil's capital Brasília.

organisations must be empowered, not least because they are essential for reaching out to rural people and convincing them of new approaches.

The Global Forum on Agricultural Research and Innovation is a multi-stakeholder membership-based platform. To emphasise inclusiveness, it will soon change its acronym from GFAR to GFAiR (see box on page 25). Its mission includes focusing on small farmers' empowerment. Among other things, it engages in what it calls Collective Actions. One of them is called "Mainstreaming land rights of the rural poor in the climate discourse". In this context, a diverse set of stakeholders is exploring common interests and identifying priorities for addressing the extreme vulnerability of landless or almost landless poor in regard to the fast growing risks of climate-induced disasters. Core objectives are to:

- raise awareness for the relevance of land tenure,
- promote the involvement of local communities,
- ensure open access to relevant data and
- share best practices.

This Collective Action is coordinated by ANGOC (the Asian NGO Coalition for Agrarian Reform and Rural Development). This GFAR member also laid the foundations for the Collective Action. Other part-

ners include the Netherlands-based Land Portal Foundation, the Association for Land Reform and Development (ALRD) in Bangladesh, the multisectoral and international Global Land Tool Network (GLTN) and the Asia-Pacific Association of Agricultural Research Institutions (APAARI).

The empowerment of local communities is necessary both for mitigating and adapting to climate change. Where people have secure land tenure, they become stewards of the environment. Their rights must be ensured accordingly.



VALERIA PESCE
works for the Global Forum
on Agricultural Research and
Innovation (GFAR, but from
February on GFAiR).

valeriapesce.ita@gmail.com



NATHANIEL DON MARQUEZ
works for the Asian NGO
Coalition for Agrarian Reform
and Rural Development
(ANGOC).

<https://www.apaari.org/>



ROMY SATO
works for the Land Portal
Foundation.

romy.sato@landportal.info

From GFAR to GFAiR

The Global Forum on Agricultural Research and Innovation (GFAR) has decided to change its acronym to GFAiR from February next year. The point is to emphasise not only innovation, but also fairness and inclusiveness.

GFAiR is a network of networks. It cooperates with organisations and institutions around the world, focusing on the transformation of the agri-food system. Regional fora on agricultural research, National Agricultural Research Systems (NARS), farmers associations, governmental extension services, civil-society organisations and the private sector are involved. GFAiR supports members' priorities and facilitates their initiatives. It organises joint projects, which are called "Collective Actions". They concern land rights in the climate crisis (see main essay), forgotten foods, inclusive digitalisa-

tion, family farming and transformational learning in higher education.

The core concern is to improve the livelihood of disadvantaged rural communities. These communities matter for two reasons:

- They are particularly prone to suffering hunger and malnutrition, and
- their full potential for producing food still needs to be tapped.

According to a recent independent external evaluation the Forum is so important that it would have to be invented if it did not exist already. In view of escalating environmental crises (climate, biodiversity, desertification and more), however, business as usual is not enough. Making the agri-food system sustainable is a top concern of the international community.

It is therefore good news that this multi-stakeholder

platform has recently been growing fast, welcoming more than 200 additional member institutions in the past two years. The network now has more than 900 members. Its new knowledge and learning website called "GFAiR Hub" went online in October.

The rebranding to GFAiR will go along with several other important changes. So far, the Forum was hosted by the UN Food and Agriculture Organization (FAO). In future, it will receive funding from DG INTPA (the European Commission's Directorate-General for International Partnerships) via the International Fund for Agricultural Development (IFAD) and be hosted by the Consultative Group of International Agricultural Research (CGIAR). In this context, GFAiR's highly diverse membership will boost the voice of developing countries.

GFAiR will also be more decentralised relying on staff in Rome but also at the CGIAR headquarters in Montpellier

and regional fora on agricultural research in Jordan (AARINE-NA), Thailand (APAARI), Uzbekistan (CACAARI), Germany (EFARD), Ghana (FARA) and Costa Rica (FORAGRO). Moreover, GFAiR is currently working on establishing a new Global Consortium of National Agricultural Research Systems (GNC). It will be launched at a global conference in June 2024.

GFAiR will tackle additional topics, including soil fertility and agro-ecology for example. At the same time, the five established Collective Actions will be brought to a good conclusion and/or continued. All of these issues contribute to boosting the global food system's resilience to shocks such as supply-chain disruptions, for example. The war in Ukraine and the Covid-19 pandemic have shown how painful shocks can be.

This network of networks stands ready to promote agricultural research and innovation with more impact. It has a vital role to play for achieving the Sustainable Development Goals. GFAiR continues to welcome new members.

LINKS

Evaluation report

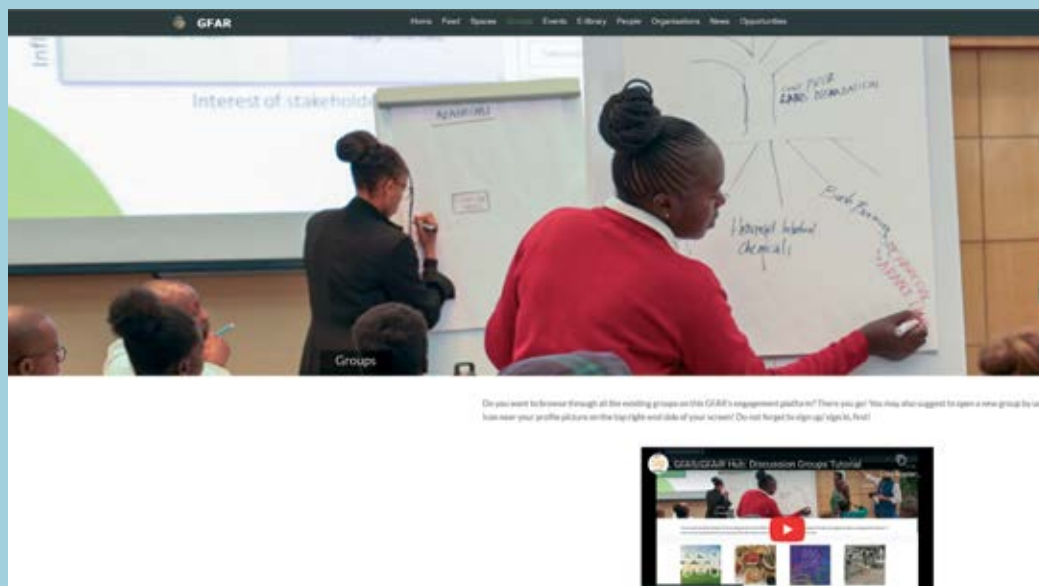
<https://www.gfar.net/sites/default/files/GFAR%20Final%20Report%20delivered%209%20May%202018.pdf>

Knowledge and learning website:
<https://opensocial.gfar.net/>



HILDEGARD LINGNAU
is the executive secretary of the Global Forum

on Agricultural Research and Innovation (GFAiR).
hildegard.lingnau@fao.org



The new knowledge hub went online in October.

POVERTY

Coping with rural deprivation

Though agriculture has helped to reduce poverty in Bangladesh, families who depend on small-scale farming still struggle economically. The climate crisis is exacerbating their problems, and they are the least able to adapt.

By Savio Rousseau Rozario

When Bangladesh became independent in 1971, it was an agrarian country with low incomes on average. Today, agriculture is no longer dominant, contributing only about 14% to gross domestic product. Nonetheless, the sector still matters very much. It employs a bit less than half of the workforce and accounts for almost 60% of female employment.

Rural livelihoods in the country's Delta landscape tend to depend on farms, most of which are quite small. More than 80% of the farmer population owns less than one hectare of land. Many people must therefore work as daily labourers or lease land from prosperous landlords. Either way, they typically work in conditions of exploitation.

Average incomes have increased in Bangladesh, so it became a lower-middle income country in 2015. While agriculture has helped to reduce poverty, families that depend on small-scale farming still struggle to make ends meet. The climate crisis is exacerbating their economic misery.

The long-term outlook is worrisome too. Environmental change is set to reduce rice production by one-third in 20 years, according to one forecast.

The typical impacts of global heating differ from region to region. The Northwest is Bangladesh's agricultural hub. It has been experiencing scant rainfall, increasing aridity and drought-like conditions. Unusual heat is becoming increasingly normal, moreover. By contrast, the Northeast has been seeing flash floods and excessive rains, while the coastal South is affected by tropical cyclones, tidal surges, sea level rise and salinity intrusion.

All of these phenomena disrupt farming. Both sudden and full-onset events

matter. Floods, storms, and draughts destroy harvests, causing immediate damage. Longer-term trends like salinisation or dropping ground-water levels, however, eventually make farms unviable.

The poorest farmers are the least able to adapt, not least because they face several socio-economic challenges. These families only have limited access to formal educa-

they pay comparatively high interest rates and thus run disproportionately great risks. Their leap of hope can end in devastating failure if an extreme weather event wipes out their harvest. Once they become unable to repay a loan, they drop into even worse poverty.

Small-scale farmers are clever and enterprising people. Their creativity enables them to cope with very difficult socio-economic circumstances. As they normally lack funding and expertise, they tend to shy away from costly innovative approaches. Unfortunately, sticking to inherited traditions is not a good choice when the environment is changing. While poor rural communities



Floating gardens.

tion. As a result, their access to support services (including skills training), financial services and technology is limited too. People with little formal education, moreover, often become victims of marginalisation, systemic injustice and exploitation.

Experience shows that small-scale farmers struggle to get cheap loans even from the state-owned Bangladesh Krishi Bank, which has the mission to support agriculture. The same farmers also hardly benefit from the government's agricultural extension services. To a large extent, they are left to themselves.

Their multidimensional deprivation has serious implications. When small-scale farmers finance investments with loans,

are particularly exposed to the impacts of climate change, they find it particularly difficult to adapt to it.

HOW TO ADAPT

There are, of course, options for adapting. In the increasingly arid Northwest, it makes sense to store water in reservoirs. Villagers thus benefit from digging ponds. Switching to crops that need less water is useful too. Instead of growing rice in two seasons, for example, a family farm may switch to potatoes in the second. Eco-farming practices like zero tillage and mulching have proven their worth. That is equally true of priming, a technology that supports seed germina-

tion with appropriate moisture and temperatures.

Adaption strategies are different in flood-prone areas. Relevant options include cage culture for breeding fish, floating gardens for growing vegetables on rafts and subsistence crop cultivation at the household level (see box). Well-advised farmers, moreover, opt for flood-tolerant and short-yielding crop varieties.

Along the ocean coast, saline-tolerant and deep-rooted crop varieties are useful. In view of the salination of existing water resources, harvesting rainwater is relevant too.

Unfortunately, some adaptation attempts have turned out to be unsustainable or to have undesired side effects. The salinisation of coastal rivers has let shrimp farming proliferate, often with good financial returns. The downside is that shrimp farming changes the local environment to the detriment of rice farming. In the coastal district of Satkhira, rice production declined by two-thirds from 1985 to 2005. Small-scale farming families were displaced accordingly.

A similar trend is reported from the Northwest, where mango orchards became

a response to more arid conditions. Mangoes are a valuable cash crop, but the orchards require less labour than rice cultivation. Unemployment increased, therefore. Here too, migration from rural areas to cities has become a common consequence.

Making the right choices obviously requires reliable information. Prosperous farmers with large land holdings typically get the professional advice and the financial services they need.

The big challenge is to empower poor farmers to choose competently. Government institutions, civil-society organisations and international development agencies have been making efforts to achieve that, but more remains to be done. Four issues deserve particular attention:

- First of all, it is important to develop leadership skills among the members – and especially women – of disadvantaged communities. Their involvement in decision-making is important, but they will not be heard unless they learn to make themselves heard. Multidisciplinary stakeholders should pay close attention to what local people need. Rural women matter in particular.
- Formal education – including vocational training, skills development, and

technological expertise – matters very much. “Farming schools” can make a difference and so can public-private partnerships.

- Access to the financial sector must improve. Rules and regulations should be made more flexible in favour of small-scale farmers. Apart from loans, insurance schemes should be considered, since they are valid risk-management tools.

- Rural communities can benefit from more localised and accurate weather reports. Early warning systems should improve as well.

To achieve progress regarding all points in the list above, cooperation and coordination among stakeholders must improve. Relevant parties are grassroots communities, government agencies at national and subnational levels, civil-society organisations and international development partners.



SAVIO ROUSSEAU ROZARIO
coordinates the Locally
Led-Adaptation (LLA)
Programme at the Interna-
tional Centre for Climate

Change and Development (ICCCAD) in Dhaka.
savio.rozario@icccad.org

Sensible practices

Rainwater harvesting is a prominent practice in the coastal region of Bangladesh where salinity intrusion is reducing the availability of fresh water in the dry season. A RWHS (rainwater harvesting system) collects rainwater from a catchment area which is sent into a reservoir for storage through pipelines. Later the stored water is filtered in a gravel filtration system. This cost-effective method is also popular in other regions, where digging ponds is difficult, for example.

Cage culture is a way to breed fish in enclosed river water. Fishing nets and/or bamboo cane can be used. The water

passes freely, but fish movements are restricted. Typically, the method is used to cultivate freshwater fish. It is popular in flood-prone regions.

The floating garden is a traditional cultivation practice. Vegetables are grown on artificial islands which are made of organic materials such as water hyacinths. These materials form rectangular rafts, on which beds are created to cultivate vegetables. Spinach, okra, turmeric, potatoes and amaranth are crops that grow well in a floating garden.

Homestead gardening refers to the cultivation of subsistence crops such as veg-

etables and fruits at the household level. It has economic and nutritional benefits. In flood-prone areas homestead gardening is being practiced in sacks

and mud bags for better mobility during flood. A new version of homestead gardening is rooftop gardening in urban areas.

SRR



Cage for breeding fish.



A man from the Samburu people in Kenya draws groundwater to water cows.

SUB-SAHARAN AFRICA

Using groundwater sustainably

In sub-Saharan Africa, groundwater offers considerable opportunities for socio-economic development, particularly in agriculture. However, expertise, financing and effective management are needed. Germany's Federal Institute for Geosciences and Natural Resources is helping partner countries address these challenges.

By Johannes Münch, Ramon Brentführer and Michael Eichholz

In past decades, groundwater resources have been massively overused – particularly in agriculture – in many world regions, including the Middle East, the Mediterranean, Asia and the USA. Falling groundwater levels and depleted water sources are the result. In view of this situation, donor countries and institutions have been very reluctant recently to promote rural irrigation with groundwater.

Nevertheless, more intensive use of groundwater resources offers considerable

opportunities in many countries. It could contribute to food security, economic development and resilience to the climate crisis. Overexploitation can be avoided with appropriate water management and governance.

One region that would benefit from such a nuanced approach is sub-Saharan Africa. According to the British Geological Survey (BGS), the region uses less than a fourth of its renewable groundwater on average for drinking water, agriculture and industry. In some countries it is even less than 10 %. At the same time, over 400 million people lack access to clean drinking water. Droughts and crop failures are making matters worse. The need is enormous.

The 6th UN Sustainable Development Goal (SDG) aims to ensure the availability of water and sanitation for all. As a decentralised resource, groundwater can help. A broader water supply can be established in cities and access to drinking water in rural areas can be provided – without building

costly new infrastructure. A project team from the Federal Institute for Geosciences and Natural Resources (BGR), working on behalf of Germany's Federal Ministry for Economic Cooperation and Development (BMZ), is researching how to sustainably exploit sub-Saharan Africa's groundwater resources.

POTENTIAL FOR AGRICULTURE

There is enormous potential for agriculture. According to the UN Food and Agriculture Organization (FAO), only three percent of cropland in sub-Saharan Africa is irrigated and only five percent of that is irrigated with groundwater. Most irrigated farms depend on surface water. Areas that are far from rivers or lakes have little scope for irrigation. They are thus particularly at risk from droughts and all that they entail. Sub-Saharan Africa has the highest rate of malnutrition in the world. Many countries in the region rely on expensive food imports.

Agricultural irrigation with groundwater also has great socioeconomic potential. Agriculture accounts for about 30 % of the region's gross domestic product (GDP) and employs about 65 % of the working population. More irrigation would increase

yields, leading to economic growth and new jobs.

GOOD AVAILABILITY

Groundwater is relevant in the context of the climate crisis. In contrast to surface water, it remains stored in cavities in rocks underground after rainy periods. At a certain depth, it is protected from evaporation and contamination. Therefore, it is also available during extremely dry periods, which are expected to increase as a result of the climate crisis. Used sustainably, groundwater resources can help lessen the impact of recurring droughts. It can also alleviate urban water crises, like the one Cape Town experienced in 2017.

There are significant challenges, however. One issue is poor knowledge of hydrogeological conditions. How deep in the ground is the water? What is its quality? How much can be extracted? Observation wells are often largely non-existent, no longer work or have not been read for years. The result is inadequate data on current groundwater levels.

DIGITISING GEOLOGICAL DATA

However, geological data regarding aquifers is often available from studies done in the past. Scientists at three major geological surveys in France (BRGM), the UK (BGS) and Germany (BGR) have found a lot of information from the past 150 years in their archives. Unfortunately, it is often only available in analogue form and cumbersome to analyse. It would make sense to digitise it – perhaps using artificial intelligence (AI) – and give it to local authorities. AI could also help predict the quality and availability of the water from this data.

According to studies by the UN Environment Programme (UNEP), sub-Saharan Africa has significantly lower capacity to manage groundwater compared to surface water. As a result, donor institutions and planning authorities have so far largely underestimated or even ignored the potential for socio-economic development.

Yet the African Ministers' Council on Water (AMCOW) called for groundwater resources to be developed back in 2018. AMCOW is a body of the African Union (AU) with over 50 member states. The BGR is supporting AMCOW on behalf of Germany's

Federal Government to develop a strategic groundwater programme. This programme should help AU members to:

- recognise the socio-economic potential of their groundwater reserves,
- mobilise investments and
- strengthen their capacities for sustainable water management.

It is important to underpin the water requirements of countries' national development plans with management goals for

"Using groundwater is comparably cheap, but sustainable schemes will still require significant investment, particularly in infrastructure and specialist training."

expanding drinking-water supply, agricultural irrigation and other water-dependent activities like mining. It is essential to always take into account the availability of water resources. In order to also reach social and economic development goals, the most effective uses must be identified.

For this kind of strategic planning, AMCOW, with support from the BGR, developed a planning instrument and tested it in Namibia. In future it should help AMCOW member states make the best possible use of groundwater resources for development goals like water security, food security and economic development. A macroeconomic model by the International Food Policy Research Institute (IFPRI) that predicts the socioeconomic impact of groundwater use is helpful too. It allows effects on GDP, the labour market and poverty reduction to be evaluated.

SIGNIFICANT INVESTMENT NEEDED

Using groundwater is comparably cheap, but sustainable schemes will still require significant investment, particularly in infrastructure and specialist training. It is therefore important to model impacts in order to convince both finance ministries and private investors.

Groundwater is typically managed locally and exploited decentrally. Financing models must take this into account. The

BGR is working with the UN Capital Development Fund (UNCDF), which specialises in financing municipal and decentralised structures. The UNCDF has developed an approach to identify actors and financing needs at the local level.

Moreover, a legal framework as defined in laws on water distribution and protection tends to be missing or inadequate. Even where sensible rules exist, their enforcement is far from guaranteed. Moreover, there are not enough experts and technical capacities for exploitation. Effective agencies are needed too.

The training and further education of specialists and the creation of strong institutions are vital for ensuring that groundwater resources are used, but not overused. The BGR supports local authorities in its partner countries with geoscience expertise. In Zambia, for example, the focus is on advanced training in well construction at a certified training institute.

For external specialists, the BGR worked with international partners to develop web-based training modules on groundwater management and well construction. The trainings are aimed at interested parties from water authorities, NGOs and private industry, including well-construction companies.

LINKS

Online course: "Groundwater Resources Management":

<https://cap-net.org/grm/>

Online course: "Professional Drilling Management":

<https://cap-net.org/pdm/>



JOHANNES MÜNCH
works for the BGR in the field of groundwater for agriculture.
johannes.muench@bgr.de



RAMON BRENTFÜHRER
is a project manager at the BGR.

ramon.brentfuehrer@bgr.de



MICHAEL EICHHOLZ
is an expert on groundwater governance at the BGR.

michael.eichholz@bgr.de



Smallholder skills are needed for global food security: farmer in Ethiopia.

GLOBAL FOOD SUPPLY

There is enough for everyone

Almost 800 million people still suffer from chronic hunger. Politicians, agribusiness and scientists argue about causes and solutions. One widespread assumption is that when people go hungry, there is not enough to eat. But it is not that simple.

By Dagmar Pruin

To defeat hunger, we do not simply need more food. Solutions that focus on boosting production volumes fail to address the root causes of global food crises. There has been enough to feed the world for decades.

However, the simplistic debate about increasing volumes kicked off again shortly after the start of Russia's war of aggression on Ukraine. It was suggested that the EU should roll back all environmental requirements in agricultural policy. Yields should be enhanced by technological innovations – from digital drone farming to chemical fertilisers, to genetically modified crops.

Much of this was put into practice. The European Commission suspended environmental requirements relating to crop rotation and set-aside land (GAEC 7 and 8 – standards for maintaining land in good

agricultural and environmental conditions). The G7 countries asked the World Bank to provide loans so that countries with low-income levels could buy more chemical fertiliser. Agricultural corporations subsequently made huge profits and paid record dividends to their shareholders.

It is doubly scandalous that millions of people are denied the human right to adequate food and that their predicament is then all too often exploited for selfish economic gains – whether from speculation on high grain prices or from the intensification of a climate-damaging agricultural model that devours more and more land for maize, rice, soya and wheat. The motto is invariably “the more, the better”.

That is the wrong approach. Brot für die Welt (Bread for the World), the globally active development agency of the Protestant churches in Germany, has worked since 2010 with a completely different campaign motto: “There is enough for everyone”. Even today, the total volume of harvests worldwide could feed more than 10 billion people.

According to a study conducted by the University of California in 2022, those harvests yield a statistical 5600 calories per

person per day. That is more than enough to keep anyone in the world from going hungry. The UN Food and Agriculture Organization (FAO) calculates that the average person's calorie intake is around 2600 calories a day.

HUNGER IS NOT A PROBLEM OF QUANTITY

So, if there is enough food, there can be only three answers to the question of why millions of people still suffer from hunger: harvests are not for direct food use, food fails to reach those who need it, or people cannot afford a healthy, balanced diet.

Sadly, all three answers are true. Almost half of the global harvest ends up in troughs as animal feed. Another large amount is left in the field due to logistical deficits such as a lack of storage facilities. Commercial and household food waste in industrialised countries is an additional problem. And last but not least, an increasing volume of food is used for biofuels and bioplastics, which means less food is produced for human consumption.

So instead of continuing to use chemical fertilisers to obtain record yields from ever-scarcer agricultural land so that crops (such as rapeseed or maize) can be grown for animal feed or agrofuels, global agricultural production needs to return to its original purpose: growing crops to secure the right to food.

Brot für die Welt supports a holistic approach to agricultural production: Agroecology is a system that gives farmers and consumers joint control over what is produced, how it is produced as well as by whom and for what purpose. By supporting research, digital innovation, education, gender equality and democratic participation, we promote the further development of this approach working to implement the concept of food sovereignty.

AGROECOLOGY AS A CRISIS RESPONSE

The current crises show how successfully agroecology can provide protection against them. Freedom from exposure to extreme equipment prices, proximity to target markets, ability to respond rapidly to grain shortages by sowing local varieties – these are arguments that have aroused keen interest in agroecology in agricultural, political and commercial circles.

In this context, we expect the Federal Ministry for Economic Cooperation and Development (BMZ) to strongly prioritise the agroecological elements of the BMZ core strategy “Living without Hunger – Transforming Agricultural and Food Systems” when planning and implementing new projects and activities.

It remains incomprehensible that the Federal Ministry for Economic Cooperation and Development intends to promote the production of green hydrogen-based nitrogen fertiliser in Kenya with a €60 million loan. Urea produced in this way is still a chemical fertiliser that will cause considerable damage to soil health, climate (nitrous oxide release) and groundwater (nitrate).

Diversified agroecological systems are more resilient, especially in the face of the advancing climate crisis. Almost a third of all carbon dioxide emissions are generated by the agricultural and food industries. For this reason alone, the expansion of volume-fixed agriculture would be a step in the wrong direction.

“Diversified agroecological systems are more resilient, especially in the face of the advancing climate crisis. Almost a third of CO₂ emissions are generated by the agricultural and food industries. For this reason alone, the expansion of volume-fixed agriculture would be a step in the wrong direction.”

We need the skills and knowledge of smallholder farmers, and we need to strengthen their rights, because they already bear the main burden of food production. Over the past ten years, many of their proposals have been included in the reports of experts on the Committee on World Food Security (CFS). Far too many of them have been blocked by opposition from agribusiness and agricultural exporting countries.

Agricultural production in the coming decades will be shaped in particular by declining rainfall and falling groundwater levels. Rain-fed agriculture will become more difficult. Modern irrigation techniques based on groundwater (over)use will not be able to compensate for this in the long term.

Here too, agroecological practices will be helpful. They offer solutions for making more efficient use of rainwater – for example by traditional retention techniques, agroforestry systems such as permaculture, the construction of new cisterns and the use of older, drought-resistant plants and varieties.

Political support should focus on these approaches and not on purely technological solutions aimed at increasing yields. Because there is enough for everyone.

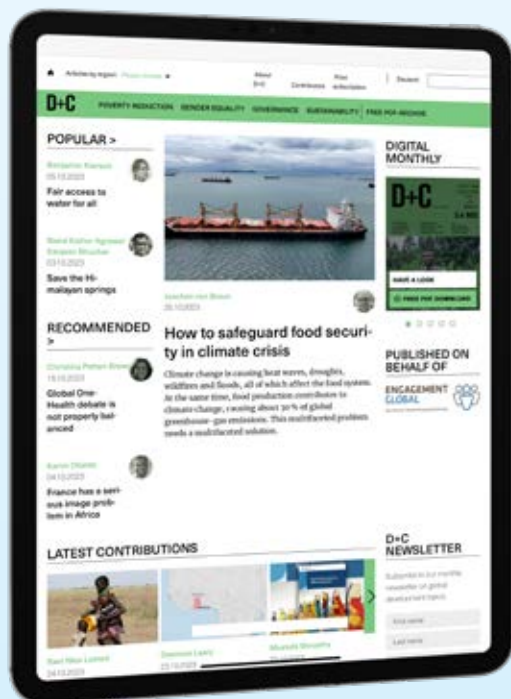


DAGMAR PRUIN
is President of Brot für die Welt (Bread for the World).

presse@brot-fuer-die-welt.de

We have redesigned our website and optimised it for mobile use.

www.dandc.eu





Seed bank in Zimbabwe's arid Rushinga district.

BIODIVERSITY

Seed banks preserve diversity

In order to ensure global food security, it is important to stop the loss of crop diversity. Seed banks play a central role and have proven their worth.

By Stefan Schmitz

An old economic adage warns: “Don’t put all your eggs in one basket.” But when it comes to agricultural production and securing the global food supply, we are doing just that. We are relying on wheat, rice, maize and potatoes, which together meet over two-thirds of global demand for calories. Agricultural production is geared towards uniformity and standardisation, and diversity is being lost at all levels: in cultivation systems, among crops and within crops.

The UN Food and Agriculture Organization (FAO) estimates that plant diversity in fields worldwide declined by 75% in the past century. One of the most important foundations of human life is disappearing. Diversity is what allows organisms to adapt to changing environmental conditions. Only if we manage to reverse the trend will agriculture become more resource efficient,

sustainable, climate resilient and productive.

Over the course of 12,000 years, farmers have bred about 200,000 rice varieties, 120,000 wheat varieties, 4000 potato varieties, 7500 apple varieties and 3000 coconut varieties. All of them trace their ancestry back to wild ancestors. Apart from crops that are well known and appreciated worldwide, there are countless others that are more narrowly distributed. Examples are millet, black-eyed peas, sweet potatoes, amaranth and macadamia nuts. Other under-researched and undervalued crops include teff, fonio, Bambara groundnut, arracacha and star fruit.

The crop diversity that humans have created coexists with related wild species, which nature has produced over millions of years. The future of agriculture – and our food supply – depends on this immeasurable genetic wealth. Any single genetic trait of a plant can hold the key to meeting future challenges that we are not even aware of yet.

Therefore, we must do everything we can to preserve this genetic diversity. Doing so resembles a natural life insurance policy.

The first step is to stop further loss of diversity, both in farmers’ fields and in the wild.

Incentives for diversifying crops and the designation of protected areas for biodiversity have not made enough of an impact so far. Unfortunately, such “in situ” efforts will probably only have limited success in future too. For that reason, a second strategy to preserve agrobiodiversity should be pursued in tandem: conservation “ex situ” in seed banks.

Over the course of the last century, such “seed libraries” have been established all over the world. They have assembled a considerable amount of agrobiodiversity. However, they need support so that they can collect and save additional crops and varieties. Moreover, they must store wild relatives of crops before they are lost forever. The situation is becoming increasingly urgent as diversity is dwindling “in situ”.

ADVANTAGES OF SEED BANKS

Seed banks are knights in shining armour for our food systems. Their purpose is to help build resilient, sustainable agriculture. They are not only a destination for researchers and plant breeders but can also distribute high-quality seed to farmers and thus contribute to local agricultural development.

The advantages of seed banks are obvious. After an initial investment, the cost to

maintain them is relatively low. Seed banks can deliver sufficient quantities of pest- and disease-free seeds across national borders all year long, independent of vegetation cycles. Well-managed collections remain stable over time, unlike varieties that are preserved under “in situ” conditions.

This means seed banks can provide raw material to breeding programmes, together with reliable – and easily accessible – data on each sample’s characteristics, so users can order precisely the materials they need. Ultimately, “ex situ” collections offer a “safety net”. They can bring locally adapted varieties back to fields where they have been lost, whether due to natural disasters or human intervention.

At the same time, it is important that crops keep evolving and adapting to changes in the living environment outside seed banks. Stored seeds do not interact with nature in an evolutionary dynamic. Valuable agricultural knowledge is lost when a variety is only conserved, but no longer cultivated.

According to the FAO, there are now more than 1750 gene banks around the world. Approximately 130 of them each contain over 10,000 genetically diverse seed samples, or so-called accessions. An estimated 7.4 million accessions are maintained worldwide. Most of the larger collections are managed at the national level. For instance, the national seed banks of Brazil, China, Germany, India, Japan, Canada, Russia, South Korea and the USA contain over 100,000 accessions each. National collections usually house a broad spectrum of plant-genetic resources of the most diverse varieties and species.

In contrast, seed banks that are linked to international research institutes often focus on a few important crops and their wild relatives. The most important institutes of this kind belong to the CGIAR (Consultative Group on International Agricultural Research) consortium. The diversity stored in their seed banks is considered a global public good, a “common heritage of humanity”,

which the international community has given to the institutes to hold in trust.

The importance of secure seed banks was demonstrated when the important collection of the International Centre for Agricultural Research in Dry Areas (ICARDA) in Aleppo was destroyed during Syria’s civil war. Fortunately, ICARDA had previously deposited backup copies of its seeds in the Svalbard Global Seed Vault on Spitzbergen. Located north of the Norwegian mainland, the Svalbard Global Seed Vault stores samples under geologically stable conditions at a depth of 120 metres in permafrost. Thanks to the copies, ICARDA was able to resume its research and breeding work at new locations in Morocco and Lebanon.



STEFAN SCHMITZ

is the executive director of the Crop Trust, the international foundation dedicated to conserving crop diversity.

stefan.schmitz@croptrust.org

Better facilities

Despite their importance for securing global food security (see main text), seed banks are often in a precarious position. They have to fight for funding,

especially in low- and middle-income countries. Crop diversity is not only threatened in fields and in nature, but also in the gene banks that are meant



Crops at a market in Morocco.

to serve as safe harbours for plant-genetic resources.

The great relevance of seed banks is generally recognised – as is the fact that international cooperation is vital for their operation. The significance of the International Treaty on Plant Genetic Resources for Food and Agriculture cannot be overstated. Known as the Plant Treaty for short, it was signed by FAO members in Rome 2001 and entered into force in 2004.

The Crop Trust is the financing mechanism of the Plant Treaty for operating seed banks. Its mission is to build a global system of such banks. Among other things, it promotes the conservation and documentation of plant-genetic resources, the creation of information systems and staff training.

The Crop Trust currently has assets of about \$300 million, based on contributions primarily from government donors. The donations are invested in the

financial market. From interest income and through third-party funds, the Crop Trust can afford to invest more than \$20 million annually in the maintenance and use of gene banks as well as in the creation of the global system.

The crop diversity that is thus preserved is the only global public good which is safeguarded by a legally independent international foundation. This structure has proven its effectiveness in principle. However, the foundation needs more resources to tap its full potential.

More needs to be done to secure crop diversity in ways that create an adequate basis for long-term food security, sustainable agriculture and adaptation to climate change. For that reason, it is important that traditional donors continue to contribute and that other sources of funding be tapped. We must preserve the future today, forever, before it is too late. SSCH

In order to clean up heavily polluted rivers in a sustainable way, living conditions along their banks must improve. **Page 16**



Photo: picture-alliance/AA/Gerald Anderson